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America set to upgrade its "Doomsday" aircraft



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JULY 2024 Vol 107 No 1

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Welcome

The world's aviation industry will be making its way to the Farnborough International Airshow (FIA) in Hampshire in July. Perhaps this year, more than any other, will see aviation in a more positive frame of mind than it has been in a long time. With the commercial sector showing solid signs of recovery in all areas since the pandemic lockdown, the demand for new, greener, more efficient airliners has never been higher, as operators seek to retire older types and begin a new operational era. Russia's 'military operation' in Ukraine

has significantly impacted air arms across Europe with a new commitment to no longer hold off long-intended aircraft and weapons upgrades to bolster the protection of their sovereign airspace. The rise in eVTOLs has also increased significantly since the last Farnborough show in 2022, with many companies taking orders and seeking certification for a plethora of designs that are about to hit the market. This has only been matched in the development of UAVs, which have seen innovative uses in both commercial areas and the battlefields of Ukraine, where the use of miniature drones has transformed the airspace over a warzone.

This impact has already seen significant billion-dollar military programmes cancelled as new, revised, cheaper ways of fighting emerge. There's no doubt that the FIA will be highlighting the most innovative developments in the aviation industry. As both the commercial and military sectors are potentially at a crossroads of which technological route to follow, there will be winners and losers this week in July.



Glenn Sands
Editor

TOP:
The future of the military and commercial aerospace industry has never looked more secure. With a war in Europe, which is leading NATO partners to upgrade sooner than planned, and airlines over the pandemic that are now seeking to upgrade their fleets
BAE Systems

FRONT COVER:
Joby Aviation completed its pre-production flight tests in early 2024 and could well be the first eVTOL company to introduce electric air taxis for commercial passenger service
Joby Aviation



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US Army Aviation is currently taking a long, hard look at itself in terms of what air assets it needs for the future battlefield. At least one significant programme, FARA, was recently cancelled, partly because of conclusions drawn from observations of Ukraine's battlefields. The decision to drop FARA cost the service more than \$2bn in development. However, in conjunction with the cancellation, the US Army also announced an "aviation investment rebalance" that ordered more Sikorsky UH-60M Black Hawks and Boeing CH-47F Block II Chinooks, as well as committing to continued investment in the high-speed V-280 Valor tiltrotor.

The Chief of Staff of the army, General Randy George, said: "We are learning from the battlefield—especially in Ukraine—that aerial reconnaissance has fundamentally changed. Sensors and weapons mounted



Sikorsky sees the UH-60M Black Hawk as the cornerstone of army aviation to meet tomorrow's global operations. One slated upgrade will see the UH-60M launching and operating intelligence-gathering drones as an airborne, forward-deployed asset

Sikorsky/Lockheed Martin

Betting on Black Hawks

on a variety of unmanned systems and in space are more ubiquitous, further reaching and more inexpensive than ever before. I am confident the army can deliver for the joint force, both in the priority theatre and around the globe, by accelerating innovation, procurement and fielding of modern unmanned aircraft systems, including the future tactical unmanned aircraft system, launched effects and commercial small unmanned aircraft systems."

The US Department of Defense (DoD) has committed itself to developing and fielding a fleet of next-generation unmanned air systems within the Group Four or Five category (weighing more than 1,320lb) that will, in part, ensure US dominance in the domain throughout the 21st Century and beyond. The US Army is now aggressively pursuing development, acquisition and lifecycle costs through joint solutions of common core technologies, architectures and training with other services. The service released its RFI on June 6, which listed required performance capabilities, such as flying 500nm at 20,000ft or more, integrating advanced technologies such as EO/IR/LD sensors, delivering precision-guided munitions and supporting multi-domain operations. The army believes that increasing capabilities with a mix of unmanned and space-based assets will more than replace what FARA could have offered the service. The intention to phase out the legacy Shadow and Raven unmanned aircraft systems adds to this.

Such decisions have freed up resources for critical new investments in army aviation. Aside from the V-280, the service is returning to types that have been its backbone for air

assault operations: the CH-47 Chinook and UH-60 Black Hawk, albeit in upgraded form.

Sikorsky has not wasted any time promoting its modernised Black Hawk, the UH-60M, which it regards as a low-risk and cost-effective option. With the introduction of Bell's V-280 Valor into service in 2030-2031, it's likely both types will serve alongside each other, with the Army intending to keep newly purchased Black Hawks in service until the 2050s and 2060s. Considering how both types will operate together, given the difference in performance capabilities, we may see future army tactical units operating a single type. Maj Gen Michael McCurry, chief of the army's aviation branch, said: "The US Army is continuing to evaluate fleet mixes and how best to integrate the tilt rotors with Black Hawk units."

With the US military learning how a future battlefield may look from Ukraine and the need to focus more attention on the Indo-Pacific region as tensions with China continue to rise, the upgraded UH-60M is the best solution currently available. With its new Improved turbine engine, the Black Hawk has more power and better fuel efficiency, so the new model can fly further and carry more, which may prove critical in the Pacific region in the coming years.

The US Army and Sikorsky have already experimented with equipping Black Hawks with low-cost, lightweight launched effects (LE) drones, which they intend to fly in swarms and feed critical intelligence to joint forces. This will offer division commanders flexibility for reconnaissance over and beyond the battlefield. Once achieved, the Black Hawk can then return to its primary air assault role

for the next phase of the operation.

However, there has been criticism of investing further in the Black Hawk, which currently consists of 120 UH-60Ms and options for an additional 135 aircraft, with delivery set for 2027-2032. For the US Army, which is actively juggling its budget and trying to establish what the service needs in terms of air assets, ordering upgraded Black Hawks such as the UH-60M, for which the basic design has already been certified, is a significant risk-reducing exercise, more evolution than revolution, and with lessons learnt from FARA, operating UH-60Ms until the late 2050s may prove a wise decision if the helicopter's basic configuration and performance parameters are still acceptable, in a similar way to those of the C-130, CH-47, F-15 and F/A-18. The only negative outlook is if there's a paradigm shift in requirements, which can only stem from combat operations.

Such a shift has already impacted the west's defence thinking about the way low-cost, multiple commercial fleets of UAVs can be highly effective over a battlefield and beyond, the impact of which is already seeing new approaches to combat tactics being openly discussed by NATO military leaders. The DoD is keen to see better battlefield information integration between all three of its services. In combat, types such as the F-22A and F-35 are already there, with V-280 and sixth-generation fighters being developed with this as a core technological cornerstone. Many of these later types will be in service at the same time that UH-60Ms are still serving, raising the question of how the veteran warhorse manages and remains effective. Sikorsky believes it will. **AI**

Sikorsky competes in DARPA's ANCILLARY programme



The rise in expeditionary deployments, particularly within the US Navy and US Marine Corps, and the broader acceptance of unmanned air systems (UAS) platforms to perform not only surveillance but to increase their use for logistical support operations led the US Defense Advanced Research Projects Agency (DARPA) to initiate the AdvANced aircraft Infrastructure-Less Launch And RecoverY (ANCILLARY) programme. Flights demonstrate an X-plane with the necessary technologies and capabilities for the next-generation vertical take-off and landing (VTOL) UAS performance. The UAS must be capable of launching and recovering from ship flight decks and small, austere locations in most weather conditions without additional infrastructure or support equipment, allowing for rapid and multiple missions typical for current expeditionary deployments. DARPA stressed that, unlike current large VTOL systems in use, a small-sized UAS would allow multiple aircraft to be stored and operated from one ship to create a tactical beyond-line-of-sight (BLOS) multi-intelligence sensor network capability from one ship, which can be relayed to higher command authorities overseeing the deployment.

From an initial nine proposals for the ANCILLARY programme, six companies have been selected. AVX Aircraft, Griffon Aerospace, Karem Aircraft, Leidos, Method Aeronautics, Northrop Grumman, Piasecki Aircraft, and Sikorsky will now develop VTOL UAS designs with the USN and USMC mission requirements.

"The goal of ANCILLARY is to increase small vertical take-off and landing uncrewed aerial system capabilities by a factor of three over the current state-of-the-art flying today," said Steve Komadina, DARPA

program manager for ANCILLARY. "Our performers are searching for innovative ways to increase payload weight and range/endurance of small, ship-launched UAS using novel configurations, propulsion and controls while also removing the need for special infrastructure."

In Phase 1b, performers will continue risk reduction design, analyses, and tests for an X-plane demonstrator to prove technologies for a future operational UAS that can be deployed and retrieved from Navy ships without the large mechanical launchers and landing/recovery equipment used today. The small UAS will need to take off and land vertically – like a helicopter – but fly missions like a very efficient winged aircraft while carrying significant payload when required.

Sikorsky has been quick to announce and release several concept images of its proposal for the ANICILLARY

programme and that it is currently conducting flight tests "to mature the control laws of a novel vertical take-off

and landing uncrewed aerial system." The company stated that these tests are intended to prove the efficiency and scalability of a twin propotor 'rotor blown wing' configuration that is fitted to the tail to take off and land like a helicopter and transition seamlessly to horizontal forward flight for longer-range endurance missions, such as ISR (intelligence, surveillance and reconnaissance) and targeting operations in the future.

The Sikorsky design uses a 'rotor-blown wing' technique, which uses constant airflow from the propotor to wash across the wing. The company believes this reduces drag on the wing in hover mode and when transitioning to forward flight, increasing its endurance and cruise efficiency.

"Flight tests are underway to verify

our tail-sitting rotor blown wing UAS can launch and land vertically with high stability and cruise efficiently on wing," said Igor Cherepinsky, director of rapid prototyping group Sikorsky Innovations.

"Key enablers to flight manoeuvrability and future vehicle scalability are our MATRIX autonomy flight control system and an articulated rotor system similar to those in traditional helicopters."

For the upcoming flight tests, Sikorsky is flying a proof-of-concept vehicle powered by a battery. If selected to produce an air vehicle for a future ANCILLARY phase, Sikorsky plans to build a 300lb hybrid-electric version with a 60-lb ISR payload.

"A network of these small UAS would be launched from a ship to provide beyond-line-of-sight F2T2 (find, fix, track, target) of surface vessels of interest for the ship commander," Komadina said. "While we anticipate this effort is most likely to support Navy and Marine missions, we have found other services are very interested in the capabilities this technology can bring to diverse missions, including logistics, strike, and special uses by the army, air force, Special Operations Command, and Coast Guard."

"We expect the operational capabilities provided by ANCILLARY will be augmented by other technologies being developed within the Department of Defense's various research and engineering organizations, such as advances in sensors, electronic warfare, and especially autonomy and artificial intelligence," said Komadina.

The project will culminate with X-plane flight tests starting in early 2026. **AI**

TOP:

A rendering of Sikorsky's design for the ANCILLARY programme on the flight deck

INSET:

The goal of the DARPA programme is to develop a Class 3 unmanned VTOL capable of flying all-weather missions from ships or land

All images via Sikorsky/Lockheed Martin



Preparing for the



Five weeks after winning its biggest contract, Sierra Nevada Corp (SNC) has released its first design round details. It is now preparing to receive its first 747-8i, which will be modified as part of the USAF's Survivable Airborne Operations Center (SAOC) programme.

On April 26, the USAF announced that it was awarding SNC a US\$13bn contract to deliver a replacement for the E-4B Nightwatch aircraft under the SAOC requirement.

The program will replace the Air Force's ageing fleet of four E-4B Nightwatch aircraft operated under the National Airborne Operations Center programme and colloquially known as

the "Doomsday" aircraft. These were designed as survivable command and control aircraft to be used as airborne command centres for the National Command Authority, issuing emergency war orders and directing US forces, including nuclear command, control, and communications (NC3), in the event of a nuclear war, and providing continuity of government. The aircraft were essentially Boeing 747-200s hardened against nuclear blast and electromagnetic pulse and outfitted with comprehensive communications systems, with an air-to-air refuelling capability to extend endurance. The aircraft frequently 'shadowed' Air Force One on overseas trips and were also used to transport the Secretary of Defense.

The E-4B allows national authorities to continue to function in even the most severe crises and can be used to direct and coordinate primary military operations or the response to other significant contingencies, including large-scale natural disasters. In the face of an ever-evolving near-peer threat, replacing these aircraft has never been more urgent. The SAOC effort represents a priority programme to modify legacy platforms to provide a replacement while meeting future mission requirements.

Though the details of the SAOC requirement remain secret, it is understood that the USAF directed using an existing Commercial Derivative Aircraft, hardened and modified to meet military requirements. The USAF probably also

MAIN IMAGE:

The E-4B serves as the National Airborne Operations Center for the president, secretary of defense and the Joint Chiefs of Staff. In response to an emergency, the aircraft provides a highly survivable command, control and communications center to direct US forces, execute emergency war orders and co-ordinate actions by civil authorities

USAF

INSET:

Sierra Nevada Corp recently released a rendering of its upgraded Survivable Airborne Operations Center

Sierra Nevada Corp



Worst



specified a US-built platform with four engines, effectively narrowing the choice to second-hand Boeing 747-800 airframes.

The USAF reportedly plans to acquire between eight and ten aircraft for the SAOC programme to ensure the US nuclear command, control, and communications capability. In the face of a hypersonic missile threat that could allow insufficient warning time to launch SAOC from ground alert, a continuous 24/7 airborne alert capability could be required if the USA's nuclear command structure is not to be decapitated by a hostile first strike.

Like the existing E-4B, the replacement SAOC will be hardened against nuclear blasts and electromagnetic pulses. It will also have comprehensive communications systems, integrating secure communications and planning capabilities with modern information technology. The new aircraft will also incorporate an air-to-air refuelling capability.

Boeing withdrew (or was eliminated from the SAOC competition) in 2023 after Boeing and the Air Force were reportedly unable to agree on data rights or contract terms for the new aircraft. Boeing noted: "We are approaching all new contract opportunities with added discipline to ensure we can meet our commitments and support the long-term health of our business."

The fixed cost-plus-incentive fee contract awarded to SNC represents probably the largest in SNC's history. It includes an initial

award of US\$59m, of \$744m this year, and \$1.7bn being sought in the USAF's FY25 budget request. The contract will cover the development and production of the SAOC Weapon System, including delivery of EMD (engineering and manufacturing development) and production aircraft, associated ground systems, and an interim customer support package. The USAF's acquisition strategy requires SNC to buy the necessary airframes and bring them to a common configuration before conversion at its new hangar complex at Dayton, Ohio, where the company is building four 90,000sq ft MRO hangars and a 120,000sq ft paint facility. SNC's first 90,000sq ft AITC hangar opened in February of 2023, with the build completed in just ten months. SNC broke ground on the second AITC hangar in the summer of 2023, and completion is anticipated by the summer of 2024. SNC has reportedly identified specific airframes for conversion and promised to provide "quality at a low life-cost for the SAOC program".

The aircraft will be developed using a modular open systems approach, and accompanying ground support systems will be established "to enable the operations, sustainment, and future modifications of the SAOC weapon system across its lifecycle" while avoiding vendor lock.

According to the announcement, the contract is expected to run through to July 2036, when work is scheduled to be completed.

Though many expected Boeing to win the contract, Sierra Nevada has excellent relevant expertise, making it well-suited to execute the SAOC contract. SNC is teamed with Collins Aerospace on the US Navy's E/A-XX Take Charge and Move Out (TACAMO) programme and has won influential admirers with its innovative open architecture Airlift/Tanker Open Mission Systems (ATOMS) connectivity kit. It aims to apply its proven JADC2 (Joint All Domain Command and Control) integration expertise to the 'no-fail' NC3 mission.

Five Korean Air 747-8i aircraft have reportedly been sold to Sierra Nevada for \$918bn Korean won (US\$674 million) for delivery by September 2025. The 747-8i entered service with Korean Air in 2015 and was initially expected to serve until 2031, when they would be replaced under the airline's ambitious fleet replacement plan. Under this plan, the airline plans to dispose of older aircraft and replace them with newer-generation airliners.

Korean has confirmed orders for 27 Airbus A350 -1000s and six A350-900s, A321neos, Boeing 787-9s and -10s, and 737 Max 8s.

Korean Air has nine 747-8is in service, with an average age of 8.1 years. Only five are owned by Koreans, and other parties own the other four. Some or all of these may also be purchased from those owners since the Air Force intends to acquire eight-ten aircraft for the SAOC fleet. JON LAKE/GLENN SANDS **AI**



FAA approves *AiRanger UAS* for surveillance

For the first time, the US Federal Aviation Administration has authorised American Aerospace Technologies Inc (AATI) and Chevron Pipe Line Company (CPL) to operate unmanned beyond-visual-line-of-sight (BVLOS) aircraft within the San Joaquin Valley in California, initially for pipeline surveillance, under a newly established waiver.

At the forefront of this authorisation is the AiRanger unmanned air system (UAS), a pioneering creation by AATI, which has an onboard detect and avoid (DAA) system. This crucial feature ensures compliance with the FAA's aircraft right-of-way rules when operating in a BVLOS scenario. AATI, a leader in providing the energy industry with air sensing and surveillance services, developed the AiRanger UAS specifically to support BVLOS operations along Chevron's pipeline and production facilities in California.

This development is a game-changer as the AiRanger is the first UAS to meet industry consensus standards for a

DAA system. This achievement enables the AATI AiRanger, with its impressive endurance of 17 hours and ability to operate at altitudes as high as 17,000ft with a range of 750 miles, to fly at medium altitudes under visual flight rules (VFR) beyond the pilot's line of sight and without observers on the ground or in the air. The AiRanger, which has an operating weight of 220lb, is equipped

with Echodyne's Echoflight radar. This radar has been fully integrated into the UAS onboard systems and proved vital in establishing the FAA authorisation.

David Yoel, CEO of AATI, said: "The AiRanger is a new type of platform due to its large scale and the range of operations it enables. Its intelligent sensors and real-time communications deliver actionable data at a previously unimaginable scale.





MAIN IMAGE:
The AiRanger's initial deployment will be for critical infrastructure patrol, threat detection and reporting, focusing on pipeline surveillance with Chevron Pipe Line and Power

BELOW LEFT:
Blue Sky Network's SkyLink 7100 voice, data, and BVLOS terminal was modified and integrated into AATI's AiRanger, to provide continuous tracking and C2 capabilities. At the same time, the aircraft conducts surveillance of Chevron's facilities

BELOW RIGHT:
Modular in design, the AiRanger is designed to be configured for a wide variety of applications utilising cutting edge avionics aimed at safe and efficient large-scale operations in civilian airspace
 All images via Chevron/AATI

With safety as our guiding principle, we look forward to expanding AiRanger operations nationwide."

AATI has partnered with Iridium Communications Inc., which connects its global L-Band satellite to AiRanger, enabling remote aerial surveillance flights. Iridium's low-latency network offers reliable and cost-effective BVLOS connectivity, including command and control (C2) and

DAA capabilities. The AiRanger will send information via satellite during a routine oil and gas pipeline inspection flight. Iridium's partner in the programme, Blue Sky Network, developed and integrated a global, dual-mode SkyLink 7100 terminal on the aircraft to enable continuous tracking and C2 capabilities for the UAS.

Ron Hume, CTO of Blue Sky Network, said: "What we have accomplished

with AATI and Iridium is a milestone to the future of scalable, cost-effective BVLOS operations. The dual-mode SkyLink solution is engineered to deliver a powerful combination of reliable connectivity, communication, and monitoring functionality, ideal for UAS operations in remote environments."

Roy Martinez, project manager for the UAS initiative and digital advisor for operations in CPL, added: "CPL operates approximately 3,000 miles of regulated pipelines nationwide. The AiRanger UAS BVLOS operations will help transform routine oil and gas surveillance and inspections required by the Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) using automated intelligence solutions. CPL's coordinated efforts with the FAA and AATI to deploy this programme is just one example of how we continue to work with federal agencies to explore and implement emerging technologies to further our purpose of developing the affordable, reliable, ever-cleaner energy that enables human progress." **AI**



Euro 100P arriving back at Bournemouth Airport from Johannesburg following a heavy check at SAA Technics. The following day, it would return to service to operate a cargo charter to Haikou, China
All images Stewart Marshall unless stated



Broker to charter

European Cargo, part of the European Aviation Group, operates a fleet of Airbus A340-600s as air freight carriers. **Stewart Marshall** visited their Bournemouth base to learn more about this relatively new business, which is doing air cargo its own way

The European Aviation Group was founded by Paul Stoddart, who initially set up shop as a buyer and seller of aircraft and spare parts. Starting his first venture in 1989, he acquired two recently retired BAC 1-11s from the Royal Australian Air Force and their spare parts inventory. The

aircraft were registered as G-KROO and G-EXPM and were ferried to the UK to be readied for resale. Stoddart immediately negotiated to sell the aircraft to Okada Air of Nigeria, which eventually accepted the aircraft in January and August 1992.

The following year, looking to make another quick turn, European Aviation purchased another 20 BAC 1-11s from British Airways. Their intention was again to quickly sell the aircraft or break them up for spares if unsuccessful. However, with an entire fleet in passenger configuration ready to go, they decided to operate the aircraft themselves in the ACMI and ad-hoc charter market under the European Aviation Air Charter [→](#)



(EAAC) name. Subsequently, with the BAC 1-11 leaving the British Airways fleet, European also found that they had inherited many of the former maintenance engineers looking for work on the ageing jets. EAAC selected Bournemouth as its operating and maintenance base in 1995, taking over the former aircraft production hangars with their new head office across the road. In due course, the group's maintenance branch at Bournemouth became renowned for its worldwide support.

In the early 2000s, European amassed a sizable fleet of 737-200s and 747-200s, which tour operators utilised in the charter sector for flights to Europe and North America until 2008, when the airline business ceased operations.

The parent company, European Aviation, has continued to trade, operating an extensive aircraft part, employee training, maintenance, and brokerage business from its original base at Bournemouth Airport. Twenty passenger aircraft have been acquired through heavy checks and sold in the region.

In 2018, the business began to acquire Airbus A340s, which were coming to the end of life with their commercial passenger operators: Iberia, Etihad, and

Virgin Atlantic. Some were scrapped for parts while others were re-sold to new operators like Azman Air of Nigeria and Spanish operator Plus Ultra Líneas Aéreas. Unbeknown to European, the remainder stored at Bournemouth would have a new, unexpected lease of life.

Answering the call

In April 2020, the demand for air cargo capacity skyrocketed as the pandemic took hold and commercial flights stopped. European Aviation received a request from a charter broker looking to transport personal protective equipment (PPE) and test kits from Asia on behalf of the UK's National Health Service (NHS). European suddenly found themselves operating commercial flights once again, leading to the new business European Cargo being formed. The nature of the request required urgency to rapidly get the aircraft into service to transport these vital supplies for the NHS. Several Airbus A340s were leased out to Maltese carrier Maleth Aero to operate under their Air Operators Certificate (AOC), as this rigorous process would take some time for European Cargo to achieve themselves. The fleet was re-registered

they could: galley storage, overhead lockers and belted into seats. In response to the lack of air cargo capacity, the European Union Aviation Safety Agency (EASA) issued approvals and exemptions for the transport of cargo in passenger cabins on a case-by-case basis, which allowed the business to remove all seating to maximise the capacity on the main deck. The new "freighters" operated with boxes of test kits piled up and then strapped down to the floor using netting, allowing for a capacity which rivalled traditional freighters. The flights continued to operate in this form non-stop as each aircraft arrived at Bournemouth from the Far East, unloaded and then departed again to pick up more cargo.

Freighter to fully-fledged cargo jet

In early 2022, following a review of the operational guidance for transporting cargo in passenger cabins, EASA concluded that the logistical challenges that arose in 2020 due to the pandemic no longer existed to the same extent. The agency, therefore determined that the exemptions and temporary approvals delivered would be extended to July 31, 2022.

RIGHT:
The bespoke cargo pods are contoured to maximise cabin space. Roller mats on the cabin floor allow for swift movement of packages in and out of the standard L2 and L4 doors

OPPOSITE BOTTOM:
Euro 600 lining up on Runway 26 at Bournemouth Airport for departure to Chengdu



in Malta and donned fitting registrations for the task at hand (9H-PPE, 9H-NHS, 9H-EAL and 9H-EAC) and shortly after the aircraft all underwent a repaint into special liveries featuring colour decals, which paid tribute to the NHS, which was working under immense pressure and risk at the time. In 2021, the airline received its AOC from the UK Civil Aviation Authority, allowing it to gradually convert its fleet to the British "G-" register while still operating its flights.

Initially, the aircraft operated with their complete passenger configuration with boxes of test kits packed into every space

Luckily for European Cargo, they were ahead of the curve and plans were already in motion with an agreed concept to carry out a permanent cargo conversion on their A340-600 fleet. During their initial consultations, the business ruled out installing a traditional cargo door as a costly structural change that would not be economical with an aircraft of their age. Instead, they opted to install a series of pods inside the main deck, loading and unloading cargo through the L2 and L4 doors and portable roller mats on the cabin floor.

The conversion process involved the

removal of all bulkheads, rear galley and toilets and replacing them with 39 pods in six different sizes. Each pod is covered by a fire containment bag tested to withstand a lithium battery fire for six and a half hours. Any fire can be contained to a single pod, safeguarding the rest of the cargo and aircraft, and enabling a safe diversion to a suitable landing location, even during long trans-oceanic flights. A sophisticated fire detection and suppression system was also installed along the cabin's ceiling, which was deemed satisfactory by Airbus and industry regulators during thorough testing on the ground and cruise.

Paperwork approval

In December 2022, the airline received a Supplemental Type Certificate (STC) for its A340-600 Class F conversion from EASA. Commenting on this landmark moment in the development of their fleet, European Cargo's Managing Director Iain Edwards said: "Our pod containment system has proven itself through a rigorous testing regime. This means we are on track for full cabin utilisation, giving each aircraft a combined belly and cabin capacity of 77 tonnes or 450 cubic metres. With six

"We have extensive experience in the Chinese market, and the route from Chengdu to Bournemouth established an exciting trade corridor"

David Kerr,
chief executive,
European Cargo



freighters already at Bournemouth for conversion and a further six available to us, that catapults us into the number one slot of UK-based wide-bodied freighters by some margin. And it makes Bournemouth Airport a huge contender in the UK air freight market."

Transitioning from PPE Charters to Scheduled Services

Over 400 flights were conducted to transport PPE and test kits from Asia to the UK in their early years, providing European Cargo with vast expertise in operating the A340 in the cargo role. As these flights started to wind down, the airline looked to diversify and explore new markets for their fleet. Ad-hoc charter requests were welcomed by the business transporting various goods worldwide. Notably, in December 2021, the airline operated a short-notice charter from Bournemouth to St Maarten in the Caribbean carrying stage and sound equipment for a billionaire's New Year's Eve party. The following April, they received a request to transport Coca-Cola concentrate from Ireland to Dallas to keep their production line going. As a result of the pandemic, there were no Irish airports available to service the A340, leaving the company no option but to truck the goods across the Irish Sea and fly directly from Bournemouth to reach the customer on time.

The airline secured a firm footing in the cross-border e-commerce market through collaboration with Shenzhen Sharing Express Logistic-Tech Ltd, which has

resulted in a dedicated e-commerce route from Chengdu to Bournemouth. The importance of the route as an e-commerce gateway was underlined by a trade mission agreement between Sichuan Province and Bournemouth, which included the signing of a cargo development agreement between Sichuan Province Airport Group Company and Regional & City Airports, which owns Bournemouth Airport. This aims to build ‘Chengdu-Bournemouth’ as a dual hub co-operation platform between Chengdu and Europe, providing a stable logistics channel for importing and exporting e-commerce goods.

The inaugural service commenced in April 2023, initially operating three times a week. However, this capacity doubled within the first six months of the route’s inaugural service and reached nine weekly services in December

OPPOSITE:

G-ECLN is being serviced on the ramp at Bournemouth. Lima November has been the backbone of scheduled operations on the Chengdu route until recently, operating exclusively while other converted aircraft had been out of service for heavy checks

BELOW:

Three company A340-600s are currently undergoing cargo conversion. The remnants of their colour scheme indicate their previous operators, apart from 9H-PGS in the middle, which is ex-Etihad A6-EHK



“We are expanding our dedicated freighter fleet as we grow our services in the e-commerce market, aiming to have eight operational by the end of the year with more to follow in 2025”

Eliska Hill, chief commercial officer, European Cargo



2023. European boasts the success of this direct link is down to the lack of congestion at Bournemouth and their mutual partnership formed with the Airport's Cargo First freight business, which controls the handling of goods from airside to landslide, allowing shipments to get to customer warehouses in half the time compared to going through a London hub airport.

Bournemouth Airport managing director Steve Gill said: "We're delighted that Cargo First is part of this strategic partnership with European Cargo, offering a fast and efficient route for cross-border e-commerce into the UK. Together, we can save customers time in a time-sensitive market. That's a huge selling point. Working with European Cargo, we've proven Bournemouth a viable alternative gateway to London and the Southeast for commercial air cargo."

The route has become a vital link, proving Bournemouth's growing role as a cost-effective and less crowded option compared to major hub airports, gaining trust from Chinese online retailers in the well-established UK market. European Cargo's chief executive, David Kerr, said: "We have extensive experience in the Chinese market, and the route from Chengdu to Bournemouth established an exciting trade corridor that ensured the timely delivery of e-commerce goods from southwest China to UK consumers. It also created significant opportunities for UK exports back to China and is among a range of potential routes we want to grow."

Following the success of this new venture, the airline is now an official UK-designated carrier for China. It has worked hard to achieve 'Scheduled Carrier' status from the Civil Aviation Administration of China. This status

allows the airline to operate freely without individual flight permits or authorisation required to enter the country.

Future growth

In the first quarter of 2024, the airline currently has four operational A340-600 freighters supported by 160 employees; however, as explained by European Cargo's chief commercial officer, Eliska Hill, exponential growth is on the horizon: "We are expanding our dedicated freighter fleet as we grow our services in the e-commerce market, aiming to have eight operational by the end of the year with more to follow in 2025. We've amassed a vast inventory of spare parts plus over 100 Rolls-Royce Trent 500 engines to support our operations and to keep our fleet operating well into the future.

Our initial services to Chengdu have succeeded through forming a strategic





partnership with our customer and creating a programme tailored to their needs. Unlike other cargo airlines, we don't consolidate freight volumes via General Sales Agents (GSAs); we guarantee the entire aircraft for a specific customer. Our e-commerce customers have millions in the UK and commit to a tight delivery schedule. Therefore, it's important to them that the flight and onward cargo handling is always on-time. The benefit of our service is that the customer has the guarantee of shipping the A340's maximum capacity of 76 tonnes on a direct flight to the UK consumer at their own specified date and time. The operation removes the risk factor from the customer when shipping internationally and they have been pleased with our performance. New routes were commenced in March 2024 to serve Haikou and Kashgar, and we will also operate several new routes to other cities in China from April." **AI**



“With six freighters already at Bournemouth for conversion and a further six available to us, that catapults us into the number one slot of UK-based wide-bodied freighters”

Iain Edwards, managing director, European Cargo

TOP:
Euro 600 climbing away from Runway 26 at Bournemouth Airport for Chengdu, China

RIGHT:
European Cargo has amassed a vast inventory of spare parts plus over 100 Rolls-Royce Trent 500 engines to support operations well into the future



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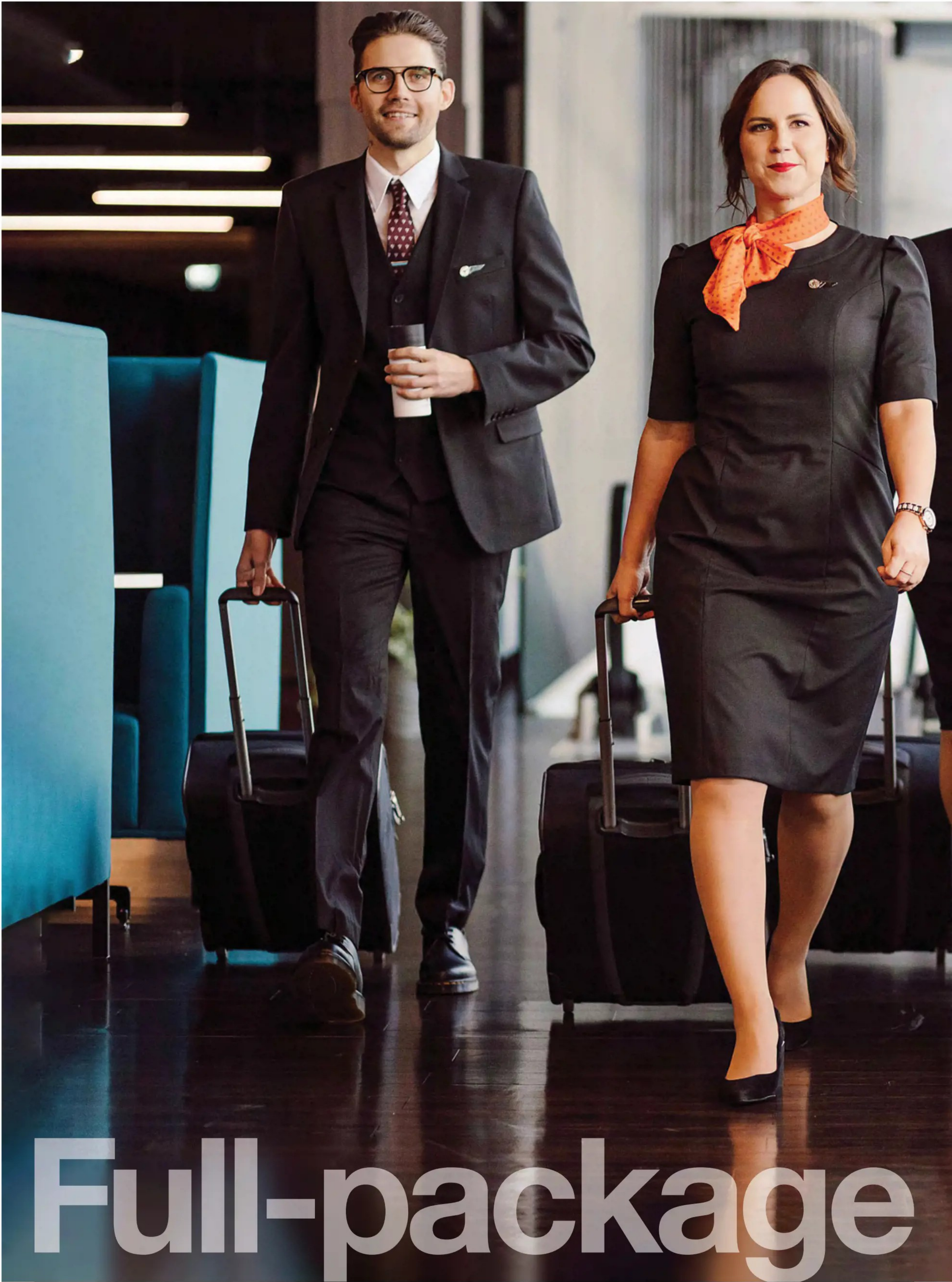


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Full-package



*SmartLynx crews are highly
trained professionals and are
well-presented at all times*
SmartLynx

fixes

Demand for aircraft and crews has never been higher, with airlines competing to meet increased passenger demands. Wet leasing has become the go-to solution, as **Michael Doran** explains

When passengers book a flight with their favourite airline and sit on a different aircraft, it may not always be a pleasant surprise.

Still, it is happening increasingly as airlines struggle to match capacity and demand.

Think of a passenger looking forward to boarding a Qantas flight from Sydney to Singapore with a QF flight number and boarding pass, only to find themselves on a Finnair A330 being greeted by Finnair flight attendants in an unfamiliar cabin.

Welcome to the world of wet leasing, where airlines strapped for capacity, be it a shortage of aircraft, pilots, or cabin crew, or are launching new routes, have contracted another airline to run the service. While this may be a familiar occurrence in Europe, it is still relatively new in other parts of the world, such as for a New Zealander hopping on a Spanish aircraft headed to Australia.

To better understand how airlines use wet leasing, often called ACMI leasing operations, where the operator supplies the aircraft, crew, maintenance, and insurance, *AI* has examined how it benefits the airlines and why they are turning to it more frequently.

A shifting demand pattern for ACMI

The last few years have changed the face of wet leasing operations, which for decades was centred around adding extra capacity in peak times or when airlines wanted to test out the demand of new routes without committing their aircraft.

The challenge for ACMI operators is seasonality. Demand is high in the northern summers when leisure-focused airlines start running out of capacity or aircraft reliability falters, and replacements

need to be found. While the quieter winter months allow time for maintenance, they have not typically been lucrative for wet lease operators, but that has changed radically due to three main factors.

The first was the scramble to restart aviation after large numbers of commercial aircraft, particularly widebodies, had been grounded during COVID-19. Returning aircraft to service is no simple matter and requires hundreds of hours of maintenance work. Still, with global MRO (maintenance, repair, and overhaul) facilities stretched beyond capacity, airlines needed more time to get them back.

Secondly, the pandemic broke aviation's well-established supply chains, and skilled labour and replacement parts were suddenly in short supply. The major airframe and engine OEMs also had manufacturing issues that squeezed new aircraft deliveries when airlines relied on deliveries to replace ageing aircraft still in storage.

The final straw has been the durability problems with the revolutionary Pratt

&Whitney GTF engine that powers Airbus A320neo Family aircraft. These problems have grounded around 350 narrowbody jets forming commercial aviation's backbone. The issue first came to light in harsher operating environments, such as India and the Middle East, and with carriers losing aircraft, the demand for wet lease replacements has changed the face of the market.

Finnair links Qantas to Asia

When Australia closed its international borders in 2020, Qantas had to make some tough decisions quickly. The Airbus A380s, the airline's jewel in the crown, were immediately withdrawn and sent to the Mojave Desert in the United States, with two of the 12 Super Jumbos never to return.

The rest of the fleet was dispersed around the country to wherever Qantas could find a parking spot, sitting idle for the next two years before international travel slowly started to return. Bringing those aircraft back into service was not





CLOCKWISE FROM ABOVE:
The Wamos Air A330 has been a success for Air New Zealand flights to Perth
 Wamos

The Wamos Air A330 business class leaves nothing out for premium passengers
 Wamos

HiFly was one of the few airlines to operate the A380 and recently ferried one from the USA to Scotland
 HiFly

The service and cabins of HiFly's A330s give passengers an excellent experience
 HiFly

a simple matter, with each A380 needing 4,500 man-hours of maintenance work before it could rejoin the active fleet.

As with most airlines, Qantas was caught short when pent-up demand burst, and it simply needed more operational aircraft, crews, maintenance, or support staff to cope. By early 2023, international demand was increasing and Qantas needed more capacity to secure its market share, so it turned to a wet lease arrangement with Oneworld alliance partner Finnair.

Qantas and Finnair agreed to a leasing arrangement for two Airbus A330-300s to operate selected flights between Sydney and Singapore from October 2023 and all services between Sydney and Bangkok from March this year. For the first two and a half years, the aircraft will be contracted on a wet lease basis, with Finnair supplying the aircraft, flight, and cabin crews while Qantas takes care of the

catering, inflight entertainment, amenities, baggage and ground support.

From late 2025, the two A330s will be dry leased for up to three years and operated by Qantas pilots and cabin crew. Qantas has a fleet of 26 Airbus A330s that it uses on medium-haul routes around Asia, so it has trained pilots and cabin crews and support infrastructure for when it switches to operating the Finnair jets.

The two Finnair A330s, registered OH-LTS and OH-LTT, are now flying daily overnight rotations between Sydney, Singapore and Bangkok after operating flights from Helsinki to New York, Doha, Chicago, Delhi and Hong Kong.

This is a classic example of how airlines use wet lease arrangements, whether with a partner airline like Finnair or a dedicated ACMI operator such as Wamos Air or Hi Fly. Qantas added two operational aircraft and thousands of seats to capture demand on popular routes it otherwise

could not operate. It bought time to return more of its A330s to service and hire or train the crews it had stood down during the pandemic.

Adding Spanish flavour to NZ

Australia and New Zealand share many things, so, unsurprisingly, they both endured some of the world’s longest and harshest COVID-19 lockdowns. When travel resumed, Qantas and Air New Zealand were left to pick up the pieces.

Air New Zealand found itself in a similar predicament to Qantas after it had despatched most of its Boeing 777 fleet to the same Californian desert. That fleet included active 777-300ERs and older 777-200s slated for retirement, although new aircraft delivery delays and engine issues on 787 Dreamliners had kept them in service longer than anticipated.

When Air New Zealand resumed international flying in mid-2022, it needed more widebody aircraft, flight and cabin crews and support personnel to meet demand. In July, it relaunched 14 international routes in 16 days, with flights headed to Australia, Honolulu, Tahiti, New Caledonia, Houston (US), Fiji and other destinations.

CEO Greg Foran said: “It takes a village to get the airline back up and running. Bringing one 777-300 out of storage in Auckland takes around six to eight weeks to prepare for the skies. By July [2022], we will be back to all nine Australian ports, which is an important milestone for us.”

At the same time, the airline was dealing with issues with the Pratt & Whitney engines powering some of its A321neo single-aisle aircraft used for short-haul international flying. With the 2022 peak summer season approaching,



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the airline turned to Spanish ACMI operator Wamos Air to operate daily flights between Auckland and Perth on the west coast of Australia.

Wamos utilised an Airbus A330-200 widebody configured in a two-class layout of 280 seats, including 20 in business and 260 in economy. It is one of four A330-200s in the Wamos fleet, including five larger-capacity A330-300s. The flight between Perth and Auckland takes around seven hours, and with Air New Zealand providing all the catering and ground services, the passenger experience is familiar.

The first tour of duty ended in October when Air New Zealand switched to one of its Boeing 787 Dreamliners. However, Wamos returned in February this year with their A330, which was on the route from early February until the end of April

2024. It was an encore performance, with Wamos supplying the pilots and cabin crews. The flight was generally well received, particularly by business class passengers who enjoyed a large suite on the medium-haul flight.

A check of the aircraft’s flight history reveals how well organised the better ACMI operators are and how quickly they can supply needed capacity from one airline to the next. The last flight from Perth landed in Auckland on April 30, and the next day, the A330 was on its way to home base in Madrid via a refuelling stop in Kuala Lumpur.

It arrived in Madrid on May 2. On May 13, it operated a flight from Madrid to Paris for French airline Corsair, followed the next day with a return flight from Paris Orly Airport to Abidjan Bouët Airport in the Ivory Coast.





An African safari for HiFly

HiFly is a brand well-known to many Europeans. Its fleet of Airbus A320, A330, and A340 aircraft is often seen buzzing around holiday spots during the summer season. It is the world's largest Airbus widebody wet lease specialist. With air operator certificates in Portugal and Malta, it offers passenger and cargo charter services on short-, medium-, and long-term contracts.

HiFly's customer list shows how widespread short-term leasing is across the industry, with airlines such as Aer Lingus, British Airways, TAP Air Portugal, Saudia, Air Canada, Air India, airBaltic, China Airlines, Ethiopian Airlines, Thai Airways and TAAG Angola using its services.

The fleet includes one A320, four A340s, and seven A330s. One of the A330s, registration 9H-HFA, has been flying in Africa, another example of how effective ACMI chartering can be for airlines. This aircraft is an Airbus A330-300 with 249 seats, 46 in business and 203 in economy, and a range of 7,460 miles at maximum passengers.

In February this year, the widebody aircraft joined the fleet of TAAG Angola Airlines and, from February 18 until May 4, operated return flights from Angola's Luanda Quarto de Fevereiro Airport to Lisbon Humberto Delgado Airport.

A typical rotation involved a departure from Luanda at 1240hrs to arrive in Lisbon at 1930hrs, departing again at 2300hrs and arriving back in Luanda at

0730hrs the following day. This aircraft had its final flight with TAAG Angola on May 4 and was replaced by another HiFly A330 (9H-TQP) on May 5, which flew the route just five times.

On May 10, TAAG Angola returned one of its aircraft, a Boeing 777-300ER, registered to the Luanda-Lisbon route. The Boeing 777 had not been out of service and had been flying regularly from Luanda to Sao Paulo, Johannesburg, Lisbon, and Cape Town in April and May.

It is a higher-capacity aircraft with 289 seats compared to the 249 seats in HiFly's A330, so with the summer schedule now operative, the total capacity on the route needed adjustment. A more obvious connection is that another TAAG Angola Boeing 777-300ER was taken out of service on February 5 and was not operating at the same time as the HiFly A330.

There was a time when HiFly counted an Airbus A380 among its fleet, so when Global Airlines needed a Super Jumbo ferried from the US to Prestwick in Scotland, they turned to the pilots and engineers at HiFly to make it happen. For technical reasons, the A380 had to fly the 5,000nm with its undercarriage down at a slower speed and lower altitude, necessitating a refuelling stop in Montreal before the long Atlantic crossing.

The flight time for the two sectors totalled 13 hours and 20 minutes, as additional time was planned to avoid demanding weather, including thunderstorms and severe icing. The

CLOCKWISE FROM ABOVE:

A Finnair A330 is now flying Qantas services between Sydney and Singapore and Bangkok
Finnair

IndiGo turned to wet leasing after several of its Pratt & Whitney-powered narrowbodies were grounded
Airbus

The Finnair A330 crew is a surprise for some Qantas passengers headed to Asia
Finnair



ABOVE:
SmartLynx is supporting IndiGo and AJet Airlines with its fleet of Airbus A320s
SmartLynx

BOTTOM:
Bringing this Air New Zealand 777 out of the desert takes thousands of hours of MRO work
Air New Zealand

A380 had been in the desert for a year and is now being reactivated, and a heavy C-check, including cabin renovation and upgrades, has been completed.

HiFly is one of just 15 airlines that fly the A380, and by operating it in more than 50 airports, it holds the record for the number of airports visited by an A380 operator. The aircraft is being returned to flying, so it will be interesting to see the markets it finds success in, although the pilgrims market between Indonesia, Southeast Asia, and Saudi Arabia is a likely starter.

SmartLynx helps out where it's needed

With a fleet of more than 350 aircraft, Indian airline IndiGo is the largest individual airline in Asia, carrying more than 100 million passengers in 2023. The low-cost carrier operates over 2,000 daily flights to around 130 destinations but suffers badly from durability issues with Pratt & Whitney GTF engines.

IndiGo has close to 200 Airbus A320neos, and due to engine problems, around 40 of those are currently grounded. Around 350 aircraft will be grounded daily through 2026 with the same issue globally.

ACMI and charter operator SmartLynx

have a fleet of 23 Airbus A320 Family aircraft. In May, six were on ACMI operations with IndiGo, while another five operated flights for AJet Airlines, the low-cost subsidiary of Turkish Airlines.

Of the six aircraft operating for IndiGo, four started in November 2023, the fifth in December 2023, and the sixth in April 2024. These aircraft predominantly operate domestic flights of around two hours to destinations such as Delhi, Bengaluru, Goa, Kolkata, Jaipur, Chennai, and Lucknow.

The A320-200s are efficient and reliable. They operate seven days a week and fly between six and ten sectors daily. A scan of their flight tracking data shows that all six jets, including the four that have been with IndiGo for more than six months, have consistently been operational without cancellations.

Before beginning operations with IndiGo, the six narrowbodies had been flying a summer rotation in Europe for Scandinavian Airlines, which included domestic and short- to medium-haul international flights. The longer flights from Scandinavia were to Palma de Mallorca, Alicante, Barcelona, and Athens, while closer-to-home destinations included Helsinki, Zurich, Manchester, Dublin, and Amsterdam.

To mitigate the grounding of its aircraft, IndiGo has secured wet and dry leases with other charter airlines and kept older aircraft in service longer than intended while adding new A320neos as they are produced. IndiGo is a different example of why ACMI operations are doing so well in 2024 and how effectively operators like SmartLynx can quickly transfer their assets when demand for ACMI services arises.

SmartLynx has also secured a significant contract with low-cost carrier AJet Airlines, which is rebranding AnadoluJet as a stand-alone carrier in the Turkish Airlines Group. AJet commenced operations on March 31 2024, with a fleet of 85 aircraft, including 45 Boeing 737-800s, ten 737 MAX 8s, 13 Airbus A321neos, seven A321-200s, four A320neos, and six A320-200s.

The wholly-owned subsidiary plans to fly 200 aircraft on 42 domestic and 80 international routes in 44 countries over the next decade. To help it on its way, SmartLynx is operating five A320-200s on its behalf under AJet flight numbers, whereas previously, it operated similar services under Turkish Airlines flight numbers.

The Airbus A320s are performing significant numbers of international flights, with one (YL-LCT) operating a steady schedule of daily return flights between Antalya in Turkey and London Stansted Airport. Other SmartLynx aircraft have been flying on behalf of AJet to destinations including Dubai, Copenhagen, Frankfurt, Paris, and Zurich and domestically to Istanbul and Ankara. **AI**



Unleashing the elite

the crucial role of AW149 training



Leonardo's AW149 multi-role helicopter is the company's latest-generation battlefield platform, reconfigurable for a wide range of demanding missions in austere operational environments.

Advanced platform and system technologies, mission equipment, and weapons, coupled with unparalleled safety and performance, high levels of survivability, and crashworthiness, provide military customers with a highly effective, survivable, and cost-effective capability. An Open Systems Architecture enables the rapid and low-cost integration of new equipment to meet changing military requirements.

Further to the Invitation to Negotiate for the New Medium Helicopter programme, which the UK Ministry of Defence announced at the end of February, Leonardo is putting forward its AW149 helicopter. With over 75 years of experience in developing and delivering training infrastructure, Leonardo combines its successful training background with in-house solutions catered to the customer. This unreproducible experience and knowledge confirm the company's position as the chosen training provider for multiple military and civil platforms.

Now, Leonardo extends these capabilities and services to AW149 – the latest-generation multi-mission platform. Leonardo, as the AW149 OEM, equips

users with the enhanced knowledge and readiness required for operational service. To achieve this, a wide range of flexible training courses, learning modules and teaching-aid technologies have been designed to deliver practical and realistic training to the end user. Some scalable training solutions include on-aircraft training, high-fidelity simulation, a full suite of courseware, delivery material, and desktop emulation.

These areas encompass the needs of aircrew, rear crew, maintainers, and ground staff. Leonardo's comprehensive solutions ensure that customer teams working on AW149 have the advanced system knowledge, awareness, and whole-crew interaction necessary to prepare for the modern battlefield.

Leonardo offers customers a range of blended services and devices that draw upon enhanced technology and tactile experience to sustain high levels of situational realism. Networkable training devices allow door gunners and winch personnel to train in augmented reality whilst aircrew simultaneously fly the same mission.

Aircrew and maintenance personnel will also be able to practise procedures and emergency drills in a low-cost, readily available environment using Commercial Off-The-Shelf components and complete DSAT- (Defence Systems Approach to Training) compliant courses utilising E-Motion Simulation.

Charlene Hennells, Helicopter Instructor at the Leonardo Helicopters UK Training Academy, explains the value of services available at Yeovil: "As the AW149 Original Equipment Manufacturer, Leonardo is best placed to ensure that the training content, delivery and devices are fit for purpose, and are fully representative of the aircraft – as designed, maintained and operated.

"Outside of virtual training environments, customers will also have access to ground and flight training provided by approved ground instructors and QHIs [Qualified Helicopter Instructors], lending the hands-on expertise and field knowledge that Leonardo has provided for decades.

"This unique amalgamation of training capability can be delivered as a complete service, or as a combined approach based on customer needs, and with customer-provided instructors in mind."

Leonardo is one of the few organisations globally, and the only one in the UK, with an end-to-end helicopter manufacturing capability. This means that Leonardo in Yeovil can design, develop, manufacture, test, and certify helicopters, in addition to providing subsequent training, support, and upgrades for customers—integral capabilities for onshore design. Leonardo stands ready to produce the AW149 in the UK should it be chosen and support the operators who will fly.





Shooting for the stars

The first crewed mission to the International Space Station by the Boeing Starliner finally lifted off on June 5 after several technical delays. **Mark Broadbent** reports

On May 6, 2024, at Space Launch Complex-41 at Cape Canaveral Space Force Station in Florida, NASA astronauts Barry 'Butch' Wilmore and co-pilot Sunita Williams – both former US Navy F/A-18 Hornet pilots – were in the Boeing CST-100 Starliner capsule atop a United Launch Alliance Atlas V rocket.

Wilmore and Williams were preparing for a Crewed Flight Test (CFT) to the International Space Station (ISS). This was the new spacecraft's first piloted mission – a crucial milestone in the process of NASA certifying the Boeing system to undertake rotational missions to the ISS after years of delays.

Launch

On May 6, 2024, approximately two hours before launch, at around 2030 Eastern Daily Time (EDT), NASA scrubbed the launch after the crew at the launch pad heard an audible buzzing noise.

ULA President and CEO Tory Bruno said during a subsequent media briefing that an issue with a liquid oxygen relief valve in the Centaur engine on the upper stage of the Atlas V rocket caused the sound.

Boeing and NASA concluded a replacement valve was required, so



A United Launch Alliance Atlas V rocket with Boeing's CST-100 Starliner spacecraft illuminated Space Launch Complex 41 on May 5, 2024, before the stack was rolled back to the Vertical Integration Facility

Joel Kowsky/NASA



the Atlas V/CST-100' stack' was rolled back to the Vertical Integration Facility at Space Launch Complex 41 for the necessary repairs.

Bruno explained that tooling would be secured to the stack to support the rocket (with the Starliner on top) before the Centaur upper stage valve is removed and replaced. The Centaur would then be re-pressurised, and the tooling would be removed before the stack is rolled back to the pad for launch.

NASA initially revised the launch date to May 17 and then again to May 25, but on May 21, a further pushback to June 1 was announced—additional launch opportunities followed on June 2, June 5, and June 6.

At the time, a Boeing statement said: "Work continues to assess Starliner performance and redundancy after discovering a small helium leak in the spacecraft's service module."

With the team's resilience and dedication, a new launch date of June 5 was set. Undeterred by the previous setbacks, the Starliner eventually lifted off at 1052hrs EDT to begin its 25-hour flight to the ISS.

Starliner's background

The CST-100 Starliner is part of NASA's Commercial Crew Program (CCP), which involves the agency working with private industry to use a new generation of spacecraft and launch systems to transport astronauts and cargo to and from the International Space Station, which is positioned in Low Earth Orbit around 200 to 250 miles (370-460km) above the planet.

The objective of the Commercial Crew Program was to end NASA's reliance on Russia's Soyuz capsule to access the ISS – necessary after the retirement of the Space Shuttle back in 2011 – and so resume launching astronauts from US soil using American rockets and spacecraft.

Another objective was to ensure two independent spacecraft were available for crew flights to the ISS, providing redundancy in case one company's spacecraft was grounded for an extended period due to a technical issue.

The CCP's origins lie in the 2010 NASA Authorization Act. Successive funding rounds led to the development of human spaceflight technologies, proposals for spacecraft capable of transporting astronauts to and from the ISS, engineering standards, and design analysis to meet safety requirements.

This work led to Commercial Crew Transportation Capability, an open competition for private companies to submit proposals for systems to operate crewed flights to the ISS. A broad set of requirements necessary to ensure crew safety in a commercial crew transportation system were identified to provide a safe, reliable, and cost-effective means of getting humans to low-Earth orbit, including the space station, and returning safely to Earth.

SpaceX's Crew Dragon and Boeing's Starliner were announced programme winners on September 16, 2014. SpaceX received a US\$2.6 billion contract and Boeing a US\$4.2 billion contract.

NASA notes: "The companies own and operate their hardware and infrastructure. NASA's engineers and aerospace specialists work closely with commercial companies, allowing for substantial insight into the development process and offering expertise and available resources. The Commercial Crew Program is the first time this model has been implemented."

SpaceX flights

The original target date for initial piloted CCP flights was 2017, but funding shortfalls and technical snags pushed

back development. Boeing and SpaceX announced a delay in the first launches to 2018 in May 2016.

SpaceX eventually launched the SpaceX Demo-1 mission on March 2, 2019, in which an uncrewed Crew Dragon successfully docked with the ISS and returned to Earth six days later. Crew Dragon then undertook a successful In-Flight Abort Test in January 2020, followed by an initial crewed test flight five months later.

SpaceX launched the first operational crewed flight, SpaceX Crew-1, on November 16, 2020. This spacecraft was docked to the ISS until May 2, 2021. SpaceX Crew-2 launched on April 23, 2021; it landed on November 9, 2021, just two days before the launch of SpaceX Crew-3.

Eight SpaceX missions to the ISS had taken place by spring 2024. The latest – using a Crew Dragon named Endeavour – docked with the ISS on March 4, 2024.

Ongoing delays

While the SpaceX Crew Dragon entered operational use, the Boeing Starliner continued to suffer delays.

The Orbital Flight Test – an uncrewed mission assessing Starliner's 'end-to-end' capabilities (launch, orbital insertion, manoeuvring, docking and return) – was pushed back to late 2019.

This flight occurred in December of that year. Still, significant malfunctions of Starliner's software and communications systems precluded the intended docking with the ISS and led to an earlier-than-scheduled return to Earth.

OFT-1 undertook a desert landing at the White Sands Missile Range in New Mexico. Unlike Crew Dragon, which returns to Earth with a splashdown in the ocean, the Starliner lands on solid ground using parachutes and two sets of sequentially inflating airbags. It is the first US space capsule designed to land back on Earth in this way.

An independent review declared the ➔

TOP:
Boeing Flight Test crew astronauts Butch Wilmore and Suni Williams Robert Markowitz/NASA

MAIN IMAGE:
The Atlas V/CST-100 Starliner stack launches atop a United Launch Alliance Atlas V rocket on the crew flight test at 1052hrs EDT on Wednesday June 5, from Cape Canaveral Boeing/Joey Jetton



RIGHT:
The Boeing CST-100 Starliner photographed from the International Space Station on its only previous visit in 2022 on an uncrewed flight test
NASA

BOTTOM:
Astronauts Butch Wilmore and Suni Williams preparing for their mission in the company's Starliner spacecraft simulator at the agency's Johnson Space Center in Houston
Robert Markowitz/NASA



unsuccessful OFT-1 a “high-visibility close call”. A second Orbital Flight Test (OFT-2) attempt was targeted for July 2021; its schedule later slipped to early the following month.

On August 3, 2021, when OFT-2 was on the pad at Cape Canaveral preparing for launch, problems were encountered with 13 valves in the capsule’s propulsion system. The launch was scrubbed, and the capsule returned to the factory.

OFT-2 eventually launched on May 19, 2022. The Starliner docked with the forward port of the Harmony module aboard the ISS – the first occasion when both commercial crew vehicles, Crew Dragon and Starliner, were docked to the ISS at the same time. Starliner delivered about 500lb of NASA cargo and crew supplies and more than 300lb of Boeing cargo.

OFT-2 left the ISS on May 25, 2022. After its return, further problems were discovered with the capsule’s parachute harness connectors and protective tape wrapped around the wiring. Work to correct those issues pushed the first crewed flight to 2024.

In the meantime, the delays to the Starliner meant NASA awarded three additional crew missions to SpaceX to cover for the shortfall in transport to the ISS.

Making history

Starliner’s first crewed launch to the ISS is, therefore, a critical test flight in demonstrating the viability of an alternative to the Crew Dragon and finally achieving the Commercial Crew Program’s objective of having two American systems fly crew and cargo to the ISS.

There is a wider historical significance, too. Although hundreds of Atlas rockets of different generations have been launched over the past six decades, an Atlas last put a human into orbit in May 1963, when Gordon Cooper flew on the earlier Project Mercury mission.

NASA points out that the first crewed Starliner launch was the sixth time the agency had put astronauts aboard a new spacecraft for the first time.

During a pre-launch media call on April 25, 2024, mission commander Barry Wilmore said: “I have full confidence in the

management that makes the decisions that filter down to the operations team; full confidence on the NASA and Boeing sides. There have been some issues in the past. That’s the past. That is not now.”

Wilmore, a Desert Storm veteran, told CBS News. “Never in my wildest dreams would I have imagined to be the crew for the first flight of a spacecraft. And here we are.”

NASA’s associate administrator for space operations, Jim Free, acknowledged that the Starliner CFT is “an absolutely critical milestone”.

Free said: “Let me just remind everybody again that this is a new spacecraft. I’ll also remind you that this is a test flight... We certainly have some unknowns in this mission; we may encounter things we don’t expect. But our job now is to remain vigilant and keep looking for issues.”

With the valve issue that emerged on launch day, it was unsurprising that the mission was scrubbed and the stack rolled back.

With the CST-100 now successfully launched, it will approach the ISS from behind and below before docking with the station at its forward port. The plan is for Wilmore and Williams to spend a little more than a week aboard the ISS, transferring 750lb of equipment, powering down the Starliner, and making sure the capsule can be used by crews undertaking ‘long-duration’ visits to the station.

After completing the Crewed Flight Test mission, NASA hopes to certify the Starliner for operational crew ferry missions to the ISS starting in 2025.

NASA says of the Commercial Crew Program: “This partnership is changing the arc of human spaceflight history by opening access to low-Earth orbit and the ISS to more people, science, and commercial opportunities.” **AI**



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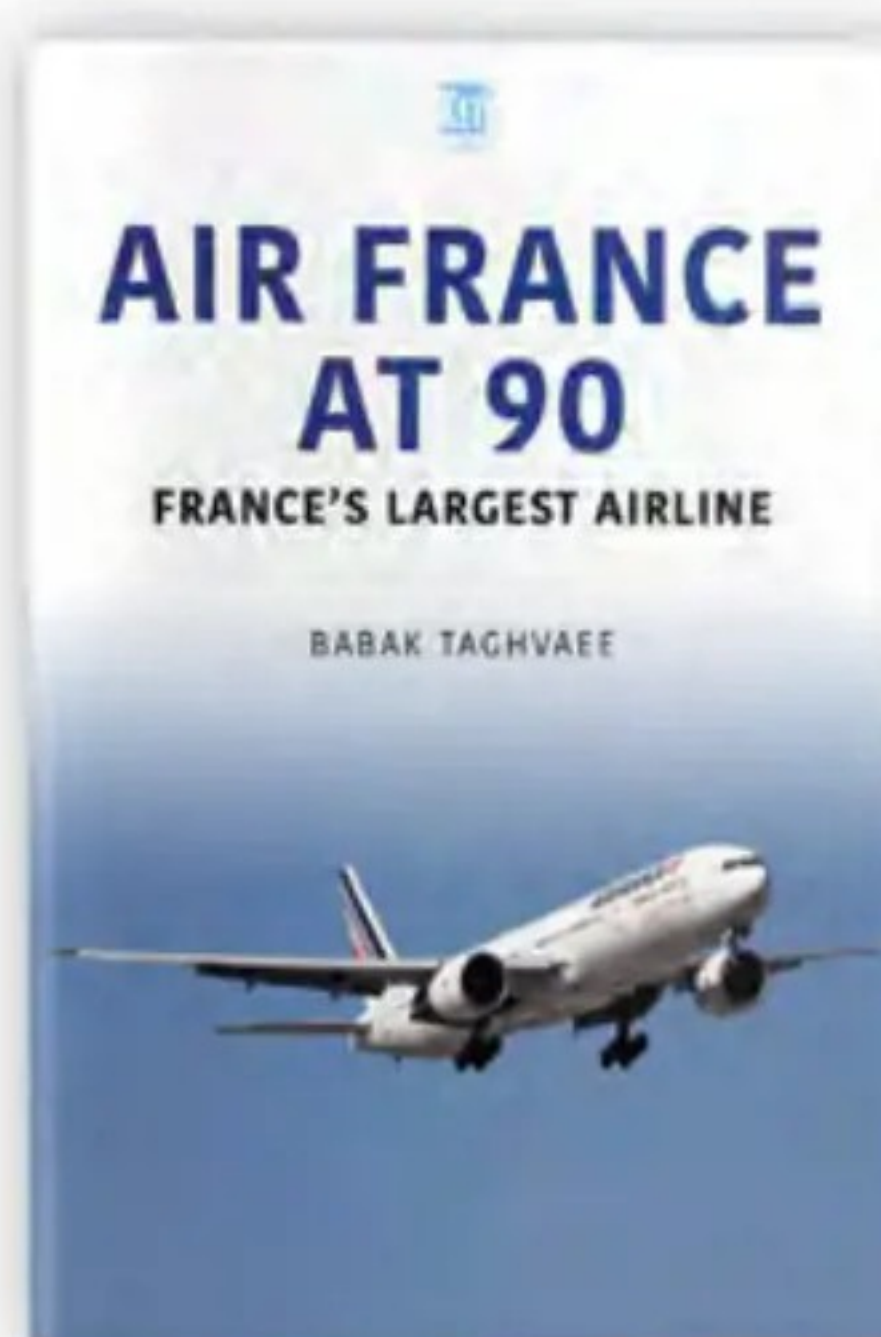
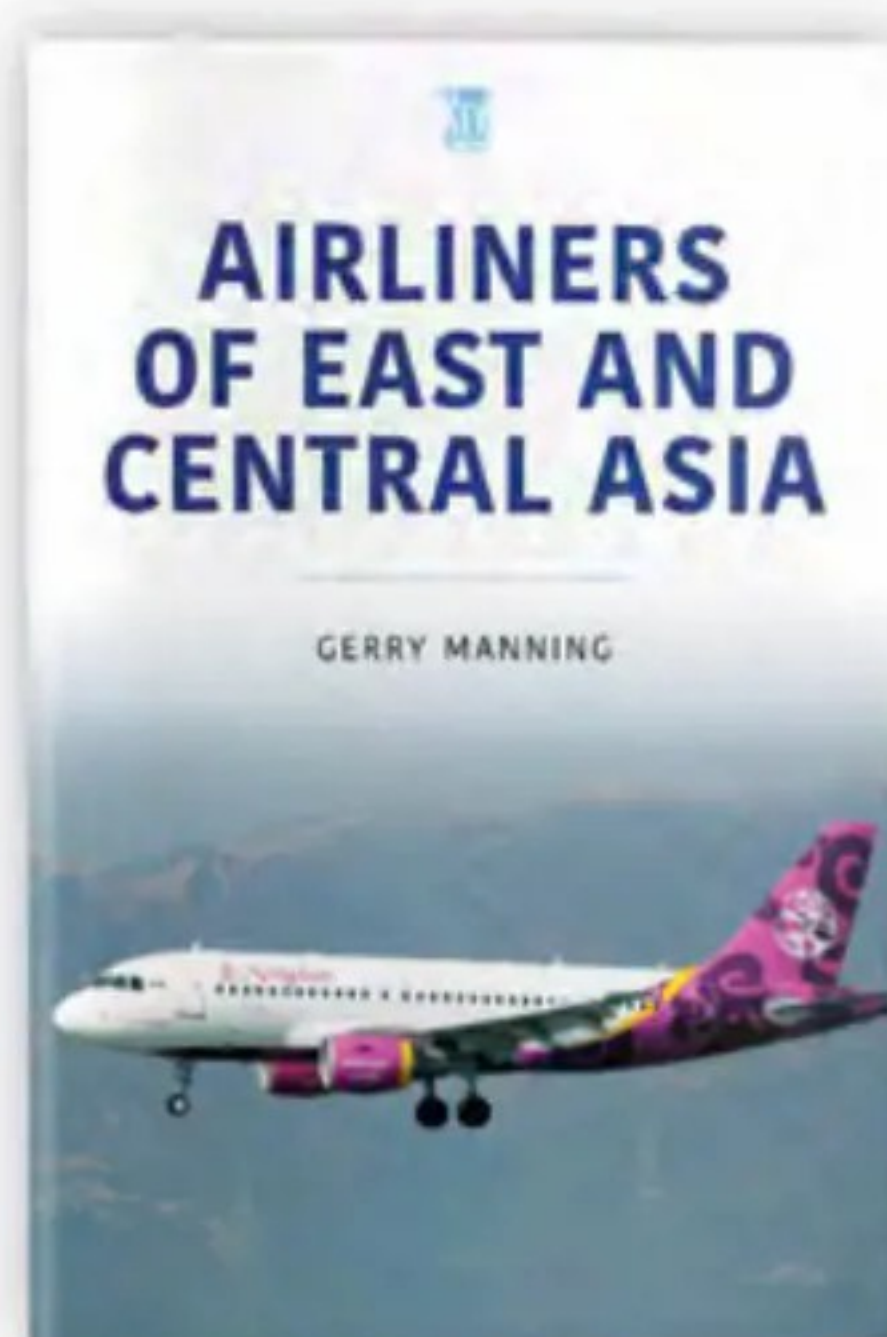
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Flying in a freezer



Are you flying into Antarctica?

Surprisingly, it's neither as rare an occurrence nor as difficult as you might think – so long as you keep a weather eye on the region's meteorology.

Alan Dron examines the skills needed for operating in this frozen landscape



It's the distances involved that are remarkable. Take off from South Africa when heading for Antarctica, and you have a six-hour wait – roughly equivalent to flying from London to Riyadh – before you see the unending white landscape unfold beneath you.

Although landing on a sheet of solid ice is less tricky than you might at first imagine, getting into one of the airstrips that dot the frozen continent can be

challenging. On a clear day, with brilliant blue sky contrasting with the white surface, no problem. But if a layer of low cloud is present, the grey-white of the cloud can merge with the landscape, giving depth of field and visual cue issues.

Operating into a location such as Antarctica demands considerable planning, as Capt Joe Dennett, former director of flight operations with London Stansted-based charter specialist [Hi Fly](#)

A blue glacial ice runway is hard and can support heavy aircraft such as the A340. Special equipment carves grooves along the runway; after cleaning and carving, the surfaces provide an adequate braking coefficient. The runway is 3,000m long, so landing and stopping an A340 is not a problem

Hi Fly

Titan Airways, can confirm.

“We ran all the risk assessments and engaged with the Civil Aviation Authority (CAA) on what we were planning,” he said. Unsurprisingly, a significant part of mission planning involved carefully noting the weather criteria. Although there are meteorologists both at the departure airport – in Titan’s case, usually Cape Town, South Africa – and at the landing strip, “You’re kind of on your own.”

Antarctic runways, constructed on the surface of 1.4km-deep glacial ice, are austere, with none of the normal landing aids. “At the site into which Titan operated they have some people there who maintain the runway, but we’re talking basically about a piste-basher.”

“We had a meteorological set of conditions that were ‘Go/No Go’ criteria. We met the meteorologist and people looking at the weather in Antarctica,” Dennett explained.

Several carriers, including Titan, have used Boeing 767s for Antarctic flights. These aircraft have sufficient fuel capacity to undertake a return trip from Cape Town. The smaller Boeing 757, also used by several operators, does not, and it would be difficult to get as far as Antarctica only to learn of a problem with the ice runway.

This necessitates calculating a go/no-go point on the outbound leg, a factor that came into play on one Cape Town-Antarctica service operated by Titan. Due to security considerations, only Dennett was initially told – shortly before departure – that an unexpected VIP group, including former US vice-president Al Gore, now an environmentalist, would be joining the flight.

“On this occasion, the weather was not as favourable as previous visits but was sufficient to meet our required departure criteria,” recalled Dennett, the commander of this particular flight.

However, conditions in Antarctica started to deteriorate en route. With



the aircraft nearing the pre-determined decision point, news of poor weather and high winds made a landing there potentially dangerous. “We had to make the decision to turn back and land in Cape Town,” he said.

Each mission conducted by Titan took one, and later two, new crew members to expand and consolidate the company’s knowledge base of operating in Antarctica. Titan operated the first widebody aircraft into Antarctica in the shape of the Boeing 767.

One such mission encountered what were described as the most



ABOVE AND TOP:

Supplies and passengers are loaded aboard Icelandair's 757 at Troll Station in late 2022

Capt Augst Hakansson/Icelandair

LEFT:

August Hakansson's Icelandair crew celebrate their arrival at Union Glacier with its blue ice runway in late 2021

Capt Augst Hakansson/Icelandair

unusual weather conditions in 15 years. Temperatures rose so much that part of the ice runway started to melt, forcing the aircraft to use a shortened strip.

Rising temperatures also created fog – a previously unknown phenomenon in those latitudes as it was usually simply too cold for moisture to form into mist.

“The physical properties of ice start to change when it gets above -5C,” explained Sven Lidström, responsible for Antarctic operations at the Norwegian Polar Institute. Blue ice, darker than snow, will attract the sun’s rays and accelerate melting.

“When it’s cold, it’s not a problem to take a big aircraft down there, but when it gets warmer, the aircraft will land on water, not ice.

“What we do is we cover the runway up with snow... if we cover it with 10cm or more of snow, it insulates it quite well.”

Another regular visitor to the frozen continent is Icelandair, which has operated Boeing 757s and 767s into ice strips for tourism and scientific purposes.

Following a proof-of-concept flight in 2015 from Punta Arenas in Chile to a 3km blue ice runway at Union Glacier for Antarctic Logistics and Expeditions (ALE) and a lengthy hiatus exacerbated by the pandemic, Icelandair has now been flying into Antarctica for three years, typically operating 16 or 17 flights over the three-month Southern Hemisphere ‘summer season’ that starts in November.

ALE’s Union Glacier Camp is a private camp, the only one of its kind in Antarctica. The camp provides accommodation for guests on guided experiences. It also serves as a logistics hub, supporting private expeditions and National Antarctic Programs from the countries that are signatories to the Antarctic Treaty.

ALE runs a ‘mini-hub’ operation from Union Glacier, said Capt August Hakansson, Icelandair’s project captain for the Antarctica mission, with two De Havilland Twin Otters and a Basler BT-67, the turboprop conversion of the Douglas DC-3, ferrying tourists, and scientists on to their final destinations on the continent.

Icelandair has also undertaken flights from Cape Town to Troll Station scientific outpost, operated by the Norwegian Polar Institute in Dronning Maud Land, some 250km inland from the continent’s edge.

Braking on an ice runway is not markedly more complex than on a normal one, with the team at Union Glacier using a machine to cut grooves in the surface to assist stopping. Ice can be “a little bit rougher” than asphalt, Hakansson said, but last season’s surface was





“exceptionally smooth”.

There are no other real difficulties, he said: “The weather gives us enough headaches most of the time. The beginning and end of the season are the most difficult. The runway is always frozen. The issue is that, initially, with the clearing of the runway, early November tends to have worse weather.”

Although there might loosely be a ‘point of no return’ (PNR) on the southbound flight from Punta Arenas, the 757 carries enough fuel for the eight-hour round trip. For the six-hour Cape Town-Troll Station sector, a 767 is used and can refuel at the Norwegian outpost.

Also using the Boeing 757 to fly into Antarctica is the Royal New Zealand Air Force (RNZAF), which operates regularly

in support of science stations there. Throughout the 2023/24 summer season, more than 200 New Zealand Defence Force (NZDF) personnel were involved in Operation Antarctica in various teams, providing crucial logistics and maintenance support to Antarctica New Zealand as part of its contribution to the Joint Logistics Pool (JLP) it shares with the United States.

Flight operations between New Zealand and McMurdo Sound are provided by the US Air Force, US Air National Guard and RNZAF, which all agree to provide coverage over certain times of the season.

Over the 2023/24 summer season, the RNZAF provided ten C-130H Hercules and five Boeing 757 flights as part of the Joint Logistics Pool (JLP) into Phoenix Airfield on the McMurdo Ice Shelf, approximately

10nm north of the US National Science Foundation’s McMurdo Station (which is situated on Ross Island).

A Transponder Landing System (TLS) was installed for the 2020/2021 season, and this piece of equipment allows a precision approach to be flown to the Phoenix runway. The indications in the aircraft are the same as for a standard Instrument Landing System (ILS) approach. The benefit of the TLS over an area navigation (RNAV) approach is that the ground-based localiser equipment is positioned right on the runway centreline, which means the aircraft tracks to the runway’s centre. In contrast, the RNAV could be 100-200ft off-centreline. A white-out landing situation ensures that the aircraft will land on the runway.

Even larger aircraft – four-engined Airbus



CLOCKWISE FROM LEFT:

Hi Fly's operations to Antarctica are carried out in seasons that generally last four months, between November and February

Hi Fly

With no refuelling at Wolf's Fang Runway, the long-range A340-400 carries sufficient fuel for the outbound and return legs. However, it is limited to a certain number of passengers to ensure adequate accommodation and supplies in the event of a delay

Hi Fly

The flights to Antarctica fly a small number of tourists, alongside scientists and essential cargo to the 'white continent'

Hi Fly



A340-300s – are operated into Antarctica from Cape Town by Portuguese wet-lease specialists, Hi Fly, primarily carrying scientists and essential cargo for scientific outposts and a few tourists.

“Commander Carlos Mirpuri made history as he was the first ever to land an Airbus A340 in Antarctica,” said a Hi Fly spokeswoman. “This aircraft proudly holds the record for the biggest airliner to ever operate in Antarctica. The A340-300 has an MTOW [maximum take-off weight] of 275 tons and a ULD (unit load devices) capacity of 11 ULD. Its exceptional range and four-engine redundancy also make it ideal for this remote operation type.”

She added that Hi Fly's operations department conducted several months of preparation, the crew received specialised

training, and the project concluded with a successful landing in November 2021. Since then, the airline has returned to Antarctica for a third consecutive season.

“The route to Wolf's Fang Runway (WFR) was almost direct. South of 65 degrees, Hi Fly reverts to polar navigation techniques and uses True heading as a reference. A plotting chart is also used to ensure that the pilots are not drifting off course,” the Hi Fly spokeswoman explained.

“Hi Fly receives via ACARS (a digital communication system) frequent weather reports from WFR passed through the operations department in Lisbon. Forecasters do a great job, and the pilots only launch to Antarctica when the weather meets the dispatch requirements. In addition, there's the need for frequent assurance that

the actual weather meets the forecast.

“There are also runway friction reports. This is measured by a specially equipped car that covers the length of the runway, taking measurements every 500 metres.

“A blue glacial ice runway is hard. It can support a heavy aircraft. The next important thing is that the cooler it is, the better. Grooving is carved along the runway by special equipment, and after cleaning and carving, Hi Fly gets an adequate braking coefficient; the runway being 3,000 metres long, landing and stopping an A340 that heavy on that airfield is not a problem.”

As anyone who has ever skied knows, good ski goggles or sunglasses are essential to protect eyes from the reflected glare from the snow. The reflection is



tremendous, and proper eyewear helps the eyes adjust between the outside view and the instrumentation. The non-flying pilot has a vital role in making the usual, plus extra, callouts, especially in the late stages of the approach.

It is not easy to spot the runway, but at one point, the pilots have to see it, as absolutely no navigation aids exist in WFR, and from around 20 miles, they must be in visual contact. There is also no visual glide slope guidance, and the runway's blending with the surrounding terrain and the immense white desert around it makes height judgment challenging. The altimeters in cold weather also suffer from temperature errors and need adjustments.

As with most airstrips in the White Continent, there are no refuelling facilities. The A340 can also off-load between two and four tons of fuel on every flight to help supply the small number of turboprops operating permanently out of Wolf's Fang.

"The long-range A340-300 carries sufficient fuel for the outbound and return legs. However, it is limited to a certain number of passengers to ensure adequate accommodation and supplies in the event of a delay. In addition, the pilots keep the number one engine running the entire time there to ensure they can reignite the engines when it is time to leave. They also leave the APU [auxiliary power unit] running," the Hi Fly



spokeswoman explained.

Perhaps unsurprisingly, weather is one of the biggest challenges that pilots face. With Icelandair's flights, for example, Antarctic Logistics & Expeditions (ALE) has two meteorologists on the staff at Union Glacier to provide incoming flights with accurate data both before they set off and during the flight itself.

Antarctic weather can change quickly; once lousy weather has set in, it can last for days. This means passengers can wait

at Punta Arenas for extended periods before take-off: "If a flight operates in the same week that it's scheduled, that's pretty much on time," Hakansson said.

Icelandair expected to operate its first flight in November this season, but the weather closed in and dumped 70cm of snow on the ice runway at Union Glacier over three days. This had to be laboriously cleared before flights could commence.

As in other parts of the globe, geopolitical rivalries are felt in the frozen



continent. China has steadily built its presence there, with a fourth research station now operational.

In turn, Australia is considering boosting its activities by constructing a new facility in Princess Elizabeth Land. This would be a multi-billion dollar permanent airfield with a 2.7km concrete runway guaranteeing year-round access to Davis Research Station, Australia's most southerly research station.

The plan has aroused considerable controversy among environmentalists, who fear the destruction of wildlife habitats and the potential triggering of similar projects among international rivals. That rivalry, particularly with China, is thought by some to be the real reason behind Canberra's keenness to establish a permanent airfield.

Antarctica has no suitable alternates, so should weather or fog generate over the airfield, it remains the only suitable landing option. We are keenly aware of the weather on the day. We keep an eye out for some critical indicators related to wind and pressure systems before launching. We also always carry an additional two hours' holding fuel on top of normal reserves, so we can hold/make multiple approaches if required.

How does a 757 handle snow?

"There's not a significant difference in how the aircraft handles. We use NZFX (Phoenix Field) for our current operations. It's 10,000ft of compacted snow that is well cared for by the team based in Antarctica.

"We have a minimum runway condition

CLOCKWISE FROM TOP LEFT:

Hi Fly's operations department conducted several months of preparation with crews receiving specialised training prior to the first landing in 2021. Since then, the airline has returned to Antarctica for three consecutive seasons

Hi Fly

The Royal New Zealand Air Force, which operates a 757 regularly in region, supports several science stations

New Zealand Defence Forces

The non-flying pilot has the critical role in making the usual instrument and visual callouts, especially in the final stages of the approach to the ice runway

Capt Augst Hakansson/Icelandair



RNZAF Operations

What's it like flying into Antarctica? Flt Lt Flynn Cribb, an experienced Antarctica Boeing 757 co-pilot who has made around 20 round trips to the continent with 40 Sqn, Royal New Zealand Air Force, the most recent in late 2023, shares some insights...

"The focus of simulator training prior to landing in Antarctica is to prepare for a white-out landing scenario should the weather deteriorate after our Point of Safe Return (PSR). This involves practising the techniques to land without visual reference on an ice runway. This is obviously not an ideal scenario and we do everything we can to avoid getting into this situation, but it's still a risk we carry on every flight.

"We operate out of Christchurch with a flight time of around four hours 45 minutes. We generally hold Dunedin as an en-route alternate on the flight south and calculate a PSR [point of safe return] to return to Dunedin. Should the weather, lighting, communications, etc., deteriorate before reaching this point, we can return to NZ with the reserves intact. Beyond this point, we are committed to arriving in Antarctica. PSR is typically around three hours 30 minutes into the flight, leaving just over an hour's flight time before touchdown.

reading (RCR) that we operate to, provided daily before a GO decision. This roughly translates to a minimum friction value and a maximum snow depth to ensure suitable braking. This RCR can deteriorate following recent snow or excessive sun. The team down there uses a lot of heavy equipment, similar to that used on ski fields, to groom the runway. They do this between every departure and arrival, so we generally minimise our use of the runway (for example, using a higher flap setting for take-off to minimise roll distance).

"There is a greater tendency for the aircraft to slip or skid during taxiing, but this is easily mitigated by using slower-than-normal taxi speeds. The touchdown is generally soft, certainly more forgiving than the pavement we are used to. We also reduce our crosswind limit significantly to maintain a good margin on directional control at touchdown.

"The frigid temperatures, around -40c, are generally too cold for significant ice formation on the aircraft structure, but we always check during flight, after landing, and before departure.

"The most notable difference when flying down there is the lack of visual cues. On an obvious day, depth perception is generally good, and all

perceptible parts of the airfield are easily identifiable early on in the approach. It is much more difficult to judge height and distance during approach when you have a cloud layer a few thousand feet above the field. The surface can blend into the cloud layer, making the horizon invisible. During these overcast conditions, some preparation is required to know what the edge markings, centreline flags, and lighting look like during the approach. Suppose you see where the runway is supposed to be about readily identifiable features, like the vehicles and structures associated with the strip. In that case, you are much better positioned to identify the runway and touchdown zone early.

"Surface and horizon definition is reported to us before making our way through PSR, and again, we must meet minimum specs. The definitions are established by an observer who looks at how defined footprints and tracks are in the snow and how clear the horizon is. The RADALT [radio altimeter] is an excellent tool in assisting flare height, and we cross-reference VNAV (vertical navigation) for profile management on the runway without visual approach lights. It is a lot easier to end up on an unstable profile when the visual cues in front of us are so deceptive." **AI**

The arrival of longer-range single-aisle aircraft, such as the Airbus A321LR, has enabled airlines to operate routes that would previously have been the province of widebody jets. However, not everyone wants to sit in a narrowbody for a medium-haul flight of ten hours, never mind a non-stop ultra-long-haul (ULH) route pushing toward the 20-hour mark.

One of the structural changes in air travel post-COVID is a preference for non-stop flights, which has impacted the hub-and-spoke models that have dominated networks for the last few decades. The arrival of aircraft such as the Airbus A350 and Boeing 787 has made it possible to profitably operate direct routes that previously were out of range – say, the Singapore to New York service flown by Singapore Airlines.

At the apex of that shift is the



Boeing's 777X program was announced in 2013 and will not enter service until late 2025

Boeing



Going the distance

New aircraft technology has made ultra-long-haul flights more economical due to improved range capabilities and lower fuel burn. **Michael Doran** examines current and future technology



“ULH is a very niche market, but it does affect the broader widebody market as airlines search for more efficiency and lower emissions”



ABOVE:
Air New Zealand pioneered the nonstop Auckland to New York JFK service using the Boeing 787-9 Dreamliner
Air New Zealand

OPPOSITE:
Qantas has ordered 12 Airbus A350-1000s for its nonstop Sydney/Melbourne flights to London and New York
Qantas

Project Sunrise initiative by Australian flag carrier Qantas, which will see flights from Sydney and Melbourne fly non-stop to London and New York from early 2026. Those flights are expected to take around 20 hours and still be quicker than the current Qantas routes, which require stopovers in Perth, Singapore or Auckland.

When the pandemic closed borders and grounded aircraft, the widebody jets spent most of their time in storage and were the last to return to service. The Airbus A380 is a prime example of a perfect aircraft languishing under a hot desert sun for months, requiring around 4,500 man-hours of maintenance work before it could fly again.

Technology drives change in commercial aviation. Now that more ULH routes are opening up and gaining customer acceptance, other airlines will likely see opportunities. *Air International* has taken a deeper look into how this niche market operates, the aircraft being deployed and what criteria airlines use to choose between the widebody jets available today.

Balancing payload and range

There is nothing new about ULH flying. As soon as aircraft arrived, pilots wanted

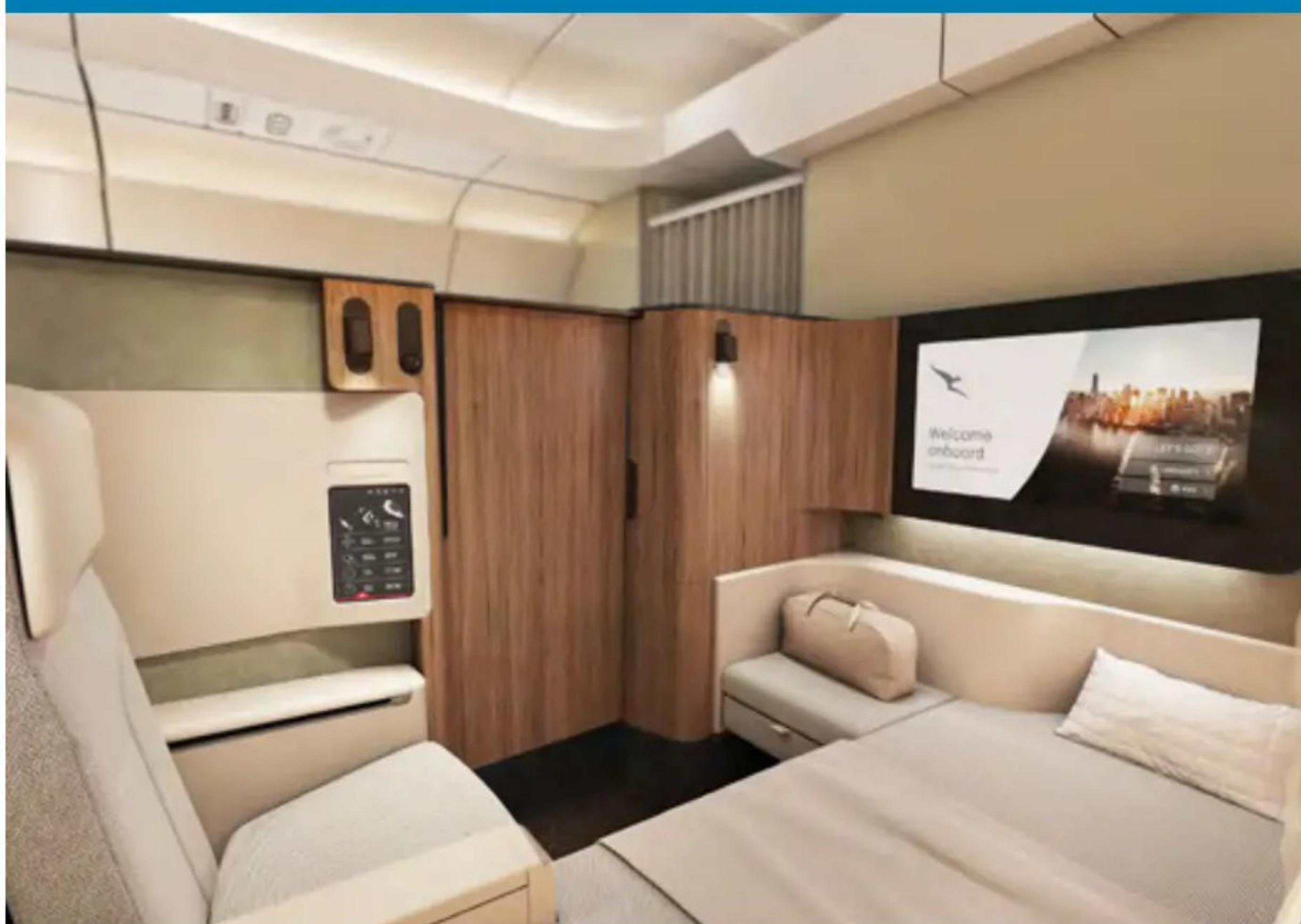
to cross the world's great oceans and bring continents together. In 1935, Qantas started flying from Brisbane to Singapore with a De Havilland 86 to connect with an Empire Airways flight to London. The overall journey was 12,574 miles and took 12 days with overnight stops.

In 1947, Qantas launched the Kangaroo Route with a Lockheed Constellation carrying 29 passengers and 11 crew from Sydney to London, with stops in Darwin, Singapore, Calcutta, Karachi, Cairo and Tripoli, including overnights in Singapore and Cairo. That took just under four days. In 1974, Qantas commenced a one-stop Boeing 707 service from Perth to London that refuelled in Bombay [Mumbai], a forerunner for today's Perth-London flights.

In 1989, a Qantas Boeing 747-400 set a world distance record for commercial jets when it flew non-stop from London to Sydney in just over 20 hours, although it carried no passengers or cargo. After 35 years, the airline is now on the cusp of repeating that epic journey with an Airbus A350 carrying 236 customers and a bellyload of freight.

That example highlights the real issue with ULH flights: the balance between distance and payload. Even if an aircraft

A Wellbeing Zone features on Qantas A350 non-stops to London and New York



The Qantas A350-1000 will fly for around 20 hours nonstop, but that won't be a chore in the First Suites Qantas

Having an aircraft that can fly non-stop from Sydney and Melbourne to London or New York is great, but how do you convince customers that 20+ hours on a plane can be enjoyable?

Qantas has solved that dilemma by designing a stunning new interior for its 12 Airbus A350-1000s, which are being built for delivery in early 2026. While the pointy end of any new aircraft is an oasis of quiet and luxury, Qantas has ensured the passengers in the back are also well looked after.

The specially modified A350 will only have 238 seats compared to a typical A350 layout of 300-350 seats, making for a spacious cabin and leaving room for the Qantas Wellbeing Zone, located between the

economy and premium economy cabins. It is an area where passengers can stretch, loosen up, follow a programme of light exercises and get premium refreshments.

Once back in their seat, economy passengers will enjoy a 33in pitch, two fast USB-C charging outlets, 13.3in touchscreen with Bluetooth audio, a six-way adjustable headrest and a multi-use seatback table. Premium economy has a 40in pitch, more personal storage options, a calf rest and an 8in winged privacy headrest.

There are 52 business suites in a 1-2-1 layout featuring a sliding door, touchscreens, Bluetooth connectivity, USB-A and USB-C, AC and wireless charging outlets, a touchscreen



Qantas has installed a Wellbeing Zone that can be used by all classes of passengers on project Sunrise flights Qantas

suite controller, a cushioned ottoman that lifts for more storage and a spacious lie-flat bed.

The suite has a large dining table and work surface, more personal storage options, an adjustable feature light, a generous 25in-wide seat and a privacy divider for the centre seats.

The A350 has six first class suites that feature a flatbed, a separate reclining armchair, dining table seating for one or two people and a full-length wardrobe, and is enclosed by 57in-high walls and a sliding door. Other highlights include a 32in entertainment screen with Bluetooth, USB-A and C, AC and wireless charging outlets, customisable LED lighting and a flexible work, seating and dining space.





ABOVE:
Emirates operates the four-class A380 between Dubai and Auckland, showcasing its new premium economy cabin
 Emirates

MAIN IMAGE:
Emirates has brought its A380s back to life on a mix of long and medium-haul routes
 Emirates

can operate in the sector, can it carry enough passengers to make a profit? Qantas is sacrificing around 70 seats compared to a typical A350 layout. Still, it is making up for that with a premium-heavy cabin, with 41% made up of first, business and premium economy passengers.

Last year, Turkish Airlines made clear its intentions to fly between Istanbul,

Melbourne and Sydney, but only when it had found an aircraft that could do it non-stop with a full complement of passengers. The airline's chairman clarified that Turkish would not adopt the Qantas premium heavy model and ultimately settled on the Airbus A350 XWB with a more standard seating configuration.

While the A350-1000 XWBs are being built, Turkish launched the route with an A350-900 that operates from Istanbul to Melbourne with a stopover in Singapore. For these flights, the airline secured the traffic rights between Singapore and Australia and can add revenue while building the market for direct services.

Airbus or Boeing?

The world's ten longest flights are operated with five different aircraft types. Anything over 9,009 miles is flown with an Airbus A350-900ULR or A350-1000 XWB. Below that range, the Boeing 787-9 Dreamliner is a popular choice, with the Airbus A380 and Boeing 777 also on the list.

ULH is a very niche market, but it does affect the broader widebody market as airlines search for more efficiency and lower emissions. At the same time, passengers want the same experience no matter which aircraft they are on. While there is a comfortable balance between



the A350-900 and 787, it is at the upper end where that balance is shaky, particularly given the issues facing Boeing with the 777X program.

The Boeing 777 has been a tireless workhorse for long-haul travel for many years, but customers are looking for a replacement, again for efficiency, emissions reduction and passenger satisfaction. Boeing introduced the replacement 777X 2013 with a projected entry-into-service date of 2021, which was good enough for launch customer Lufthansa to place an order for 34 777-9X aircraft. The story from then is for another day, but suffice to say Boeing says it will now enter service in 2025, although significant customer Emirates believes it will more likely debut in 2026. While most of Boeing's issues have been with the 737 MAX, there have also been tremendous disruptions to 787 production and deliveries, leading to orders for the A350 that have encouraged Airbus to announce increasing production rates for its flagship widebody.

At the end of March, Airbus had unfilled orders for 625 A350s, while Boeing had 481 orders for the 777X, led by Emirates (205), Qatar Airways (74), Singapore Airlines (31), Lufthansa (27), Etihad (25), Cathay Pacific (21), All Nippon Airways (20), British Airways (18), Air India (10), Cargolux

Airlines (10), Ethiopian Airlines (8), Silk Way West (2) and 30 examples for unidentified customers. At last year's Dubai Air Show, Emirates supported the 777X program by ordering 55 777-9s to start delivery in 2025 and 35 of the smaller 777-8 variant to begin arriving in 2030.

The 777X is the centrepiece of Emirates' strategy to connect cities on all continents, particularly when its fleet of A380s moves towards retirement. Speaking at an aviation conference in March, Emirates CEO Sir Tim Clark said: "We did the first deal at the Dubai Air Show in 2012. So we thought probably ten years, nine years was OK. Here we are now and it's going into the end of next year. With what's been happening at Boeing and the FAA increasing its surveillance and scrutiny, I'm also beginning to doubt that."

The outcome of that delay is that airlines must keep their 777-300ERs flying longer than planned, with some having to return aircraft from storage to meet the heavy post-pandemic demand. This has also involved refurbishing interiors to today's standards, both with 777s and A380s, which have cost airlines millions of dollars in unplanned maintenance costs.

The Boeing specifications show that the 777-8 will carry 395 passengers in a

typical two-class layout with a range of up to 10,000 miles, while the longer 777-9 can carry 426 passengers up to 8,390 miles. While the 777-9 is 20ft longer, both have the same wingspan of 235ft 5in with the folding wingtips extended and 212ft 9in when retracted.

Airbus gives the A350-900 a range of 9,500 miles and a maximum of 440 passengers, while the A350-1000 has a range of 10,000 miles and can carry up to 480 passengers. Those figures don't necessarily apply to the bespoke ULH versions that Singapore Airlines and Qantas use, which are fitted with an additional fuel tank and have reduced seating.

What may also influence aircraft selection will be the success of Qantas's non-stops to London and New York, with the airline already flagging more direct routes to Paris, Frankfurt, Cape Town, and Rio de Janeiro. Major hub airlines such as Singapore Airlines, Emirates, Qatar and Etihad may see opportunities for more ULH services piggybacking on the work done by Qantas and Airbus over the last decade. The A350 XWB was pitted against the 777X for Qantas's Project Sunrise, but there was no competition in the end, given Boeing's decision to shut down production of the new aircraft while it got its act together on other





CLOCKWISE FROM ABOVE:

Qatar Airways flies the Airbus A350-1000 nonstop between Doha and Auckland

Airbus

Ultra-long-haul flights demand luxury like the Qatar Airways A350

Airbus

Boeing's 777X program was announced in 2013 and will not enter service until late 2025

Boeing

The Singapore Airlines' Airbus A350ULR is the king of the world's most extended flights table

Airbus



widebody aircraft underpins our decision to increase the production rate for the A350 to 12 aircraft a month in 2028."

That suggests Airbus expects to sell around 144 A350s a year, and the advantage it holds is long lead times in widebody deliveries when airlines want to shift to more fuel-efficient aircraft to help meet their 2030 emission reduction goals. It is crucial that Boeing presses on with the 777X and gets the aircraft certified to keep its customers committed and not switching to Airbus.

programmes. The 777X will be a great aircraft and a worthy competitor for ULH operators, but for now airlines might opt for the certainty of the A350 platform.

Each month, Airbus and Boeing release details of the number of aircraft they delivered, the number in backlog and the orders they received. In its March report, Airbus noted it had delivered 142 jets in the first quarter, including seven A350s, and it had unfilled orders for 410 A350-900s and 215 A350-1000s. Airbus CEO Guillaume Faury remarked on the strength in the widebody market: "Airbus started 2024 with a solid order intake across our businesses. The strong momentum on

The ten longest flights

There are no hard and fast definitions of a ULH flight. Generally speaking, it is a route typically flown with a stopover, such as Melbourne-London, Singapore-New York, Doha-Auckland, Bengaluru-San Francisco, Auckland-New York or Houston-Sydney.

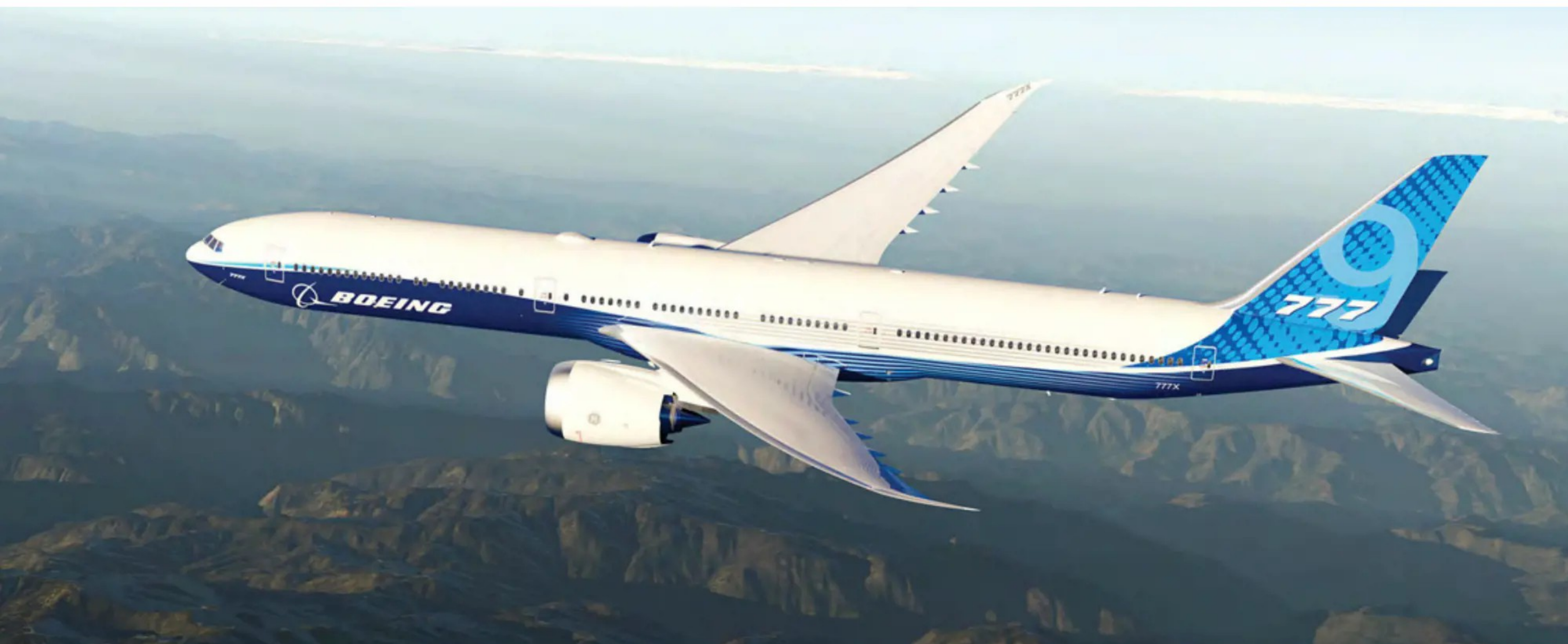
An excellent place to start is the current list of the world's ten longest flights as measured by miles, although even that will be debated, as some measure it by flight time. Within that ranking of ten routes, six airlines are operating five different aircraft types, and one of the critical variables is passenger capacity, which ultimately

impacts both the aircraft's range and the airline's profitability.

Singapore Airlines operates three routes from its base at Singapore Changi Airport, with non-stop flights to New York/JFK, Newark Liberty International and Los Angeles International. The flights range between 9,537 and 8,770 miles, with flight times of approximately 18 hours and 50 minutes. They rank as numbers one, two and eight on the top ten list. The airline has three versions of the Airbus A350 in service and for its ULH routes operates the A350-900ULR, which is configured in a very spacious layout of just 161 seats. This may be one of the few commercial

Singapore's New York flight, yet there are double the number of seats in a similar-sized aircraft. The Singapore layout will appeal to passengers and generate more income per seat than the Qatar service, which may have a different passenger profile to fill the more expensive seats.

In 2018, as a prelude to Project Sunrise, Qantas launched non-stop flights between Perth on the west coast of Australia and London Heathrow. Flight QF9 was previously flown from Melbourne to London via Singapore, but Qantas redirected it to operate a domestic sector from Melbourne to Perth then direct to London. The flight from Perth



aircraft without an economy cabin as it designates the layout as 67 business class and 94 premium economy.

According to Airbus, a typical A350-900 seats between 300 and 350 passengers, so the ULR variant has been configured with passenger comfort as a high priority for a flight of around 19 hours. The airline also operates an A350-900LR, which seats 253 passengers, and a medium-haul version, which seats 303.

For the third-longest flight, the starting point shifts from Southeast Asia to the Middle East and the capital of Qatar, Doha. Qatar Airways operates from Hamad International Airport to more than 170 global destinations using a fleet of more than 250 aircraft. The number three ranking is for the Doha-Auckland service using an Airbus A350-1000 for the 17hr 35min flight of 9,032 miles, with a two-class layout of 46 in business and 281 in economy.

The seating layout between Qatar Airways and Singapore Airlines is an excellent example of how different airlines can operate the same aircraft type but change the design and seat numbers to suit their marketing and profitability objectives. The Qatar Airways flight is a little over an hour shorter than

to Heathrow, which ranks fourth on the top ten list, takes 17 hours 20 minutes to cover the 9,009 miles using a Boeing 787-9 Dreamliner. As with Singapore Airlines, Qantas has taken a premium-heavy approach to passenger loads, with 236 seats split between 42 business, 28 premium economy and 166 economy seats, compared to a typical two-class layout of 296 seats.

Qantas also holds the fifth spot with a slightly shorter non-stop flight from Melbourne to Dallas Fort Worth International in the US. The 787-9 Dreamliner is again the aircraft of choice in a 236-seat configuration for the 17-hour, 35-minute trip over 8,992 miles.

In September 2022, Air New Zealand launched non-stop flights between Auckland and JFK, a distance of 8,828 miles that places the route as the sixth longest. The Boeing 787-9 Dreamliners on this route have 275 seats, including 27 in business, 33 in premium economy and 215 in economy.

In June 2023, Qantas launched a similar route with a short trans-Tasman flight from Sydney before heading non-stop to JFK using 787-9 Dreamliners. Qantas is learning valuable lessons with

its ULH flights from Auckland and Perth that will undoubtedly be used when Project Sunrise kicks off in early 2026.

It may surprise you that Emirates only enters the ranking at number seven for its Dubai-Auckland route. This uses an Airbus A380-800 for the 8,824-mile journey, which takes 17 hours and 10 minutes, using the four-class ULR A380 on this route. The flight covers just four miles less than Air New Zealand's 787-9 with 275 seats, but the A380 has 484 seats, comprising 14 in first, 76 in business, 56 in premium economy and 338 in economy.

The ninth spot belongs to Air India, which operates a non-stop service between Bengaluru and San Francisco International, using a Boeing 777-200LR for a flight of 8,701 miles that takes 17 hours and 40 minutes. This is the only appearance of a 777 in the top ten, and Air India has these configured with 296 seats, including 28 in business, 48 in premium economy and 220 in economy.

The tenth longest route is Qantas flight QF8 from Dallas Fort Worth to Sydney Kingsford Smith. Qantas operates the 8,579-mile service with a Boeing 787-9 Dreamliner and has a scheduled flight of 16 hours 44 minutes. **AI**





Fixed and focussed

Owned by rock star Bruce Dickinson, Caerdav is one of the UK's only truly independent MRO companies. Its reputation as one of the best in the business means its about to introduce an additional line at its maintenance facility as **Glenn Sands** discovered

Lifting off the tarmac on the afternoon of May 30 from St Athan, South Wales, a Ryanair Boeing 737-800 heads back into service with the operator. This event may only seem significant once you look at the bigger picture. It was the last in a batch of 19 aircraft in the care of Caerdav, the UK's only independent, fully approved, and certified provider of maintenance, repair and overhaul (MRO) that has been earning a reputation for excellence and quality in one of the most demanding aviation sectors.

Operating from the former RAF maintenance base, complete with a 6,000ft ILS (instrument landing system) runway, Caerdav has earned the respect of countless airlines around the globe, such as easyJet, TUI and flyadeal, in supporting their aircraft fleets. With the demand for commercial aircraft and the host of companies that support them unlikely to diminish anytime soon, the MRO sector is becoming ever more competitive and the ability to meet deadlines, source parts, and repair

others is how reputations are earned. For Caerdav, theirs is amply justified in terms of what they can offer, as Richard Pitts-Robinson, the company's commercial director, explains: "What we are offering as an MRO company compared to the larger competitors is our independence; we are not bound to a particular airline or any ownership of an airline. We have a reputation for being approachable and our management team can make decisions very quickly compared to many larger corporate businesses.

"We've gained a reputation for being very open and honest with our customers, and we try to get any issues out in the open to find solutions. When you deal with aircraft, there are always interesting things we find and it's often how you deal with those that sets you apart from your competition."

With many operators now keeping their aircraft in service longer, due in part to the impact of the global pandemic, it has meant that MRO companies like Caerdav must handle aircraft that in the past may well have been retired. Pitts-Robinson explains: "Issues that we are ➔

Caerdav specialises in MRO work for Airbus A320s and Boeing 737s

All images via Caerdav

finding are simply due to the age of the aircraft. We have been dealing with types anywhere from six to 20 years old this winter. Obviously, the older the aircraft, the more structural issues you may find, and it's down to how we deal with those problems on an aircraft-by-aircraft basis."

Post-pandemic, like many global MRO companies, Caerdav has had to change how it operates while embracing a huge increase in demand for such work. To do this has meant substantially increasing its manpower. "Right now, we have

around 180 employees, including those on the shop floor, back office, and all the support functions. Over the next six months, we're looking at a double-digit increase in staff," says Pitts-Robinson.

The company's expansion plans, alongside an increase in staff levels, include additional resources. "We are a two-bay facility but we will increase to three bays in November," explains Pitts-Robinson. "Our clients wanted more slots and we had to have a plan to accommodate this. We've managed to

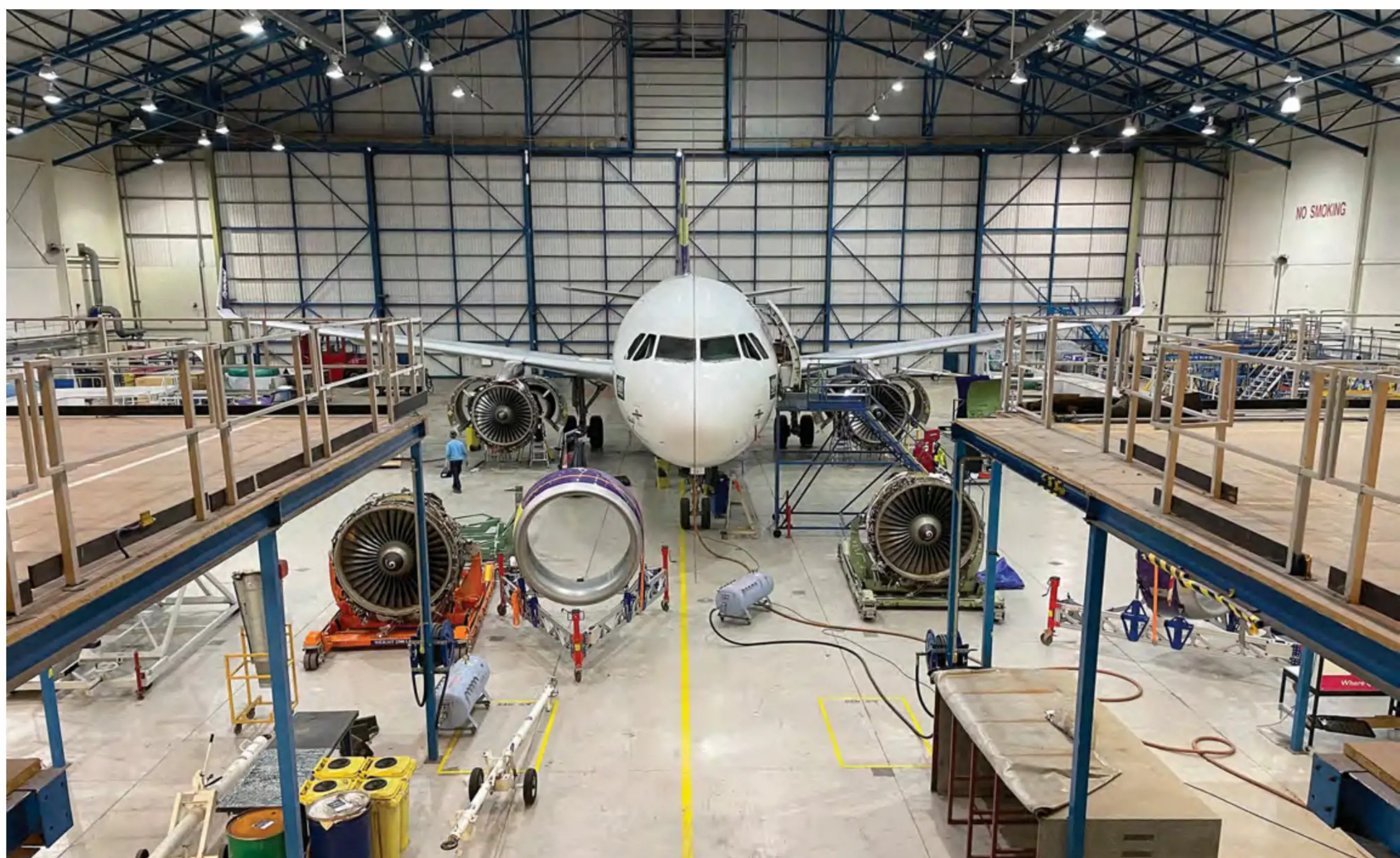


RIGHT:

A knowledgeable and highly skilled team offers a comprehensive catalogue of base maintenance services, from A Checks to heavy C Checks

BELOW:

Caerdav customers benefit from access to modern hangars, which incorporate back shops for composite repairs and paint services



Caerdav: the future past

For Caerdav's chairman, Bruce Dickinson, the goal of making his MRO the best is based on working extremely hard to put the customer first: "Aviation is a testing industry, and it's taken a few years to get the right people in place, but we're certainly on the way now. Our vision is clear: to provide exceptional service, foster enduring relationships and establish ourselves as a reliable supplier to major global aviation businesses. This vision is not just a goal, but a passion that drives us."

Caerdav has plans in place to grow significantly in the next few years, increasing to three lines this year, and Dickinson is well aware of what the industry needs: "I think it's fair to say the pandemic has had a lasting impact on the industry. Having so many aircraft grounded for so long, followed by the global supply chain issues, shifted focus onto MROs and the vital role they had to play to get those aircraft flying again. The industry has never quite reverted to how it was once. Now, MROs are ahead of the curve, with airlines, lessors and the like searching for available aircraft maintenance slots and demand far outstripping supply."

"Looking to the future, I think the shift in focus will remain, with operators and airlines leaning heavily on more independent MROs to help spread the load and ease the demands on their in-house teams. There is plenty of work to go around. We may expand our footprint in St Athan by adding a dedicated paint bay, maybe open more maintenance line stations at other airports to join our one at Cardiff. We will remain flexible and ready to adapt to the market, but in five to ten years Caerdav will certainly be bigger, stronger and even more well-established in the global MRO market."

These plans will, of course,

mean more trained employees, and Caerdav's already has an apprenticeship programme in place: "The apprenticeship programme means everything to me and the business. Investing in future talent and providing support to nurture the skills of the young is key for the industry. Our first cohort has just graduated from their three-year course – all earned full-time contracts at Caerdav. We're just about to welcome our third group in September, and the whole programme is going from strength to strength."

Setting up an aviation business from scratch presents a mountain of challenges to overcome, and Dickinson is extremely candid about the early days of Caerdav: "There were times when I thought the main lesson to learn about opening an independent MRO was not to open an independent MRO! However, over time, that feeling ebbed away as plans for the business started to come to fruition. Of course, setting up any aviation business was always going to pose an array of challenges. Still, the support we've received from the Welsh government and the local community has been immense. For that, I will be forever thankful."



Bruce Dickinson wants to make Caerdav the best MRO company out there

"The apprenticeship programme means everything to me and the business"

Bruce Dickinson,
chairman, Caerdav

modify our existing hangar to include a third line, so it's quite an exciting time and we're looking forward to it."

To explain the process following on from an initial contact to a client's aircraft being in the hangar, Pitts-Robinson says: "If you're a one-off customer it can be quite a short process with just one or two aircraft. We'd ask for the appropriate time to plan, but we can make it all happen in weeks. Whereas with some of our bigger customers, from those early initial conversations to where we put two lines of aircraft into our hangar, it can be months. We can turn our decisions around pretty quickly as a management team, as we've got quite a 'flat company structure'. If the directors and senior team think it's a good idea, we can make any request happen quickly and ensure all the safety and compliances are followed. It's a process we're getting pretty good at now!"

An additional post-pandemic impact within the MRO sector has been the increase in demand for winter slots as Pitts-Robinson explains: "We are seeing the winter season extended quite considerably by a few months either side, simply due to slot demand. There's been no choice but to extend its time to the early summer period."

"Everyone wants all their aircraft maintained in the winter and everything flying in the summer, which is how it's been for a while, but even more so as the airlines need to capitalise on that summer flying. One of the things we have managed to take advantage of is our line maintenance space at Cardiff Airport. We're providing a daily and overnight support service from now on for ACMI operator Avion Express aircraft that go all over Europe."

The new line station is manned by six dedicated technicians from Caerdav who are rated to work on Airbus A320 and Boeing 737 aircraft. Initially working on the A320 operated by Avion Express for TUI Airways for the 2024 summer season, Caerdav is seeking to make it a permanent fixture at the airport.

Chris Coleman, Caerdav's managing director, is keen to see this arrangement develop: "This is a major step forward in Caerdav's ongoing growth strategy, enabling our skilled workforce to provide outstanding line maintenance to a major international airport. We're excited to add this string to our bow, establishing new relationships with both Avion Express and Cardiff Airport that we hope to develop further over time."

Pitts-Robinson adds: "It means we ➡

can now capitalise on both the traditionally busy winter periods and the packed summer flights requiring line maintenance, which is good for the company.”

With the increase in demand throughout the MRO sector showing no signs of slowing in terms of aircraft types arriving on Caerdydd’s ramp for work, the variants can be easily divided, according to Pitts-Robinson. The number of older types needing work has slowed, only to be replaced with newer models. “To be honest, some of the 737s we are getting in are old aircraft, but at the moment our focus is

on the A320 and the 737; we’re stepping down in support of the 767 and 757 over the coming months. But that’s very much to look at replacing those with the MAX and the neo over the next 12 to 18 months.

“So, in terms of the A320 family, it can be anything from the A318 to the A321 and the 737 next-generation fleet is planned to be the mainstay of the business, and through the winter period, this may well be a six-year through to a 20-year check on aircraft like this, particularly with the 737, which is something we have been managing this winter.”

TUI Airways has been working with Caerdydd since 2019 and has sent more than 40 of its aircraft to St Athan for MRO work





“What we are offering as an MRO company compared to the larger competitors is our independence; we are not bound to a particular airline or any ownership”

Richard Pitts-Robinson, commercial director, Caerday



Pitts-Robinson attempts to describe a typical schedule in a busy winter programme, although he quickly points out that this can change and routinely does from one month to the next. “I think from an airline perspective, they’d like to think there was a ‘typical winter programme’ because they are looking for certainty over the next few years.

“For us, a winter programme, like the one we have just completed, had two maintenance lines from September 1 and those went all the way through until the end of May when the last aircraft flew out of St Athan – so that’s nine months.

“We had aircraft going through heavy maintenance, which was a mix of six, eight, 14 and 20-year-old aircraft. These were extensive and can take anywhere from 15 days to a month to complete, depending on the size of the checks being performed.”

With demand increasing year on year, for Caerdav, as with many other MRO companies, a move to a round-the-clock operation may well be on the horizon. Indeed, work patterns have already been adjusted. “We currently have four night-shifts during a typical week, but going into next winter, it’s basically going to be an increase in staff numbers all round on weekends and weekdays, and also an increase night shift coverage. So, into the next winter season we will pretty much be a 24/7 business, as far as work schedules are concerned,” says Pitts-Robinson.

“We aim to get these aircraft done as efficiently as possible through the winter, as the airlines want them turned around and flying again, and this all needs to be accomplished within an agreed timescale. The more trained staff we can put on those aircraft, the more efficient and shorter those turnaround times will be.”

Returning to the shift in aircraft types that look set to arrive on Caerdav’s ramp, Pitts-Robinson believes it is down to where the aviation industry currently finds itself and the impact of outside influences. “We’re seeing a bow wave of aircraft checks coming along. The MAXs have been flying for an average of three years now and from a heavy MRO perspective, those aircraft start becoming interesting from the checkpoint view when you hit six years. It’s the start of the flow of the heavy checks on these models that we’re just starting to see coming.”

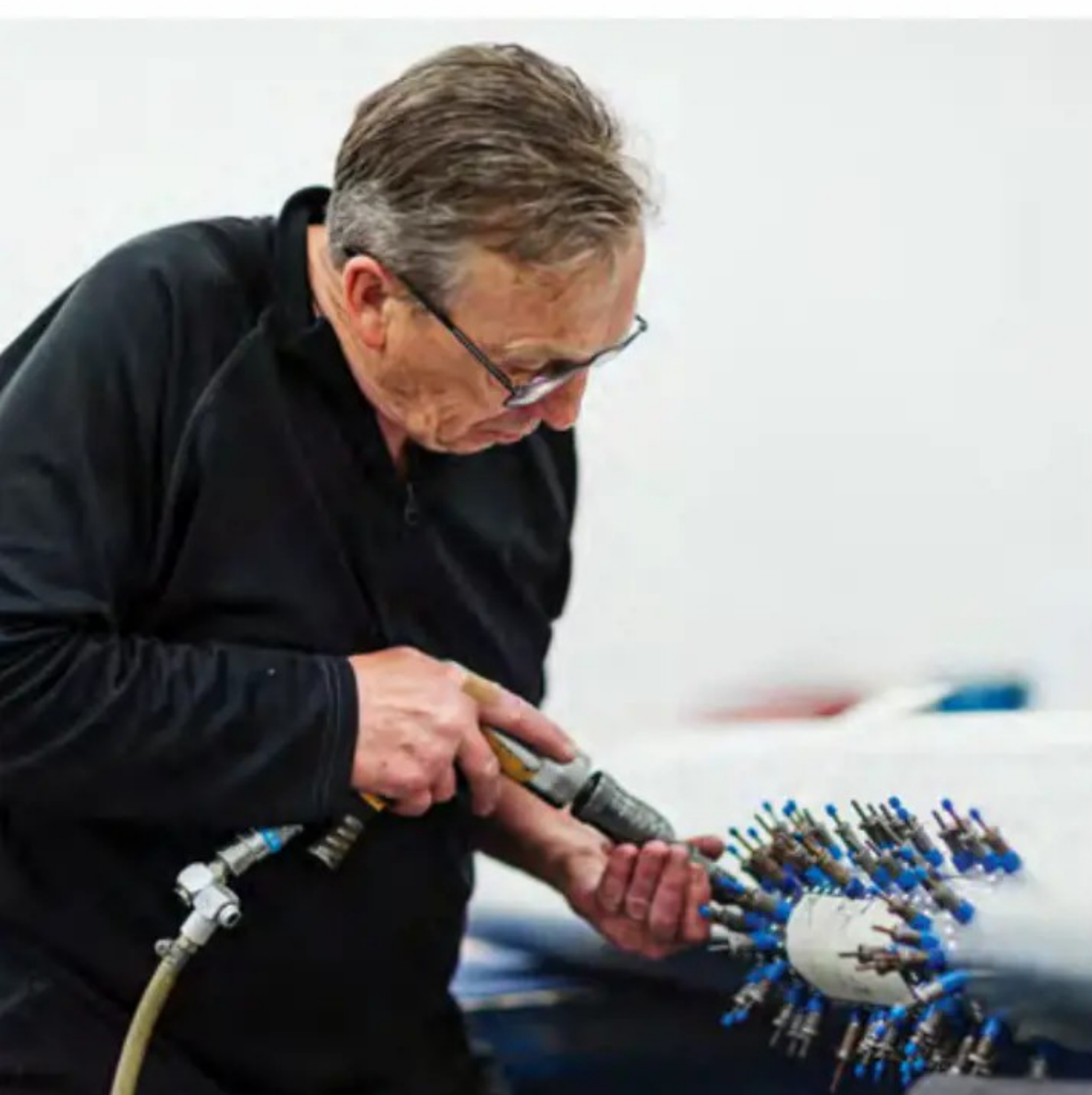
With Caerdav’s workload only set to increase each year, the supply chain across aviation has been a focus following the pandemic. Pitts-Robinson says: “It’s industry-wide and everyone in the OEM sector is discussing it. I don’t believe it can be pointed at any particular moment, but we are in a slightly different environment now. The slowing of some aircraft deliveries means those in service are flying for longer and, therefore, are in a different service environment and have different needs now than if they had been generally retired. You’d still likely have supply issues, but it will be different.

“From a Caerdav view, we’ve put a lot of money into ensuring all our teams are up to speed with any post-Brexit items that may impact us, and our shipping side is well-trained to ensure we can get parts in from anywhere in the world. We’re not restricted in any way where we can get parts. But I’d say it’s not specific to a particular aircraft type; it’s just a general slowing of things within the industry.

“Some airlines and companies have invested lots of money into spares and I think they are currently reaping those benefits. We’re always managing how much stock we hold and closely examining what minimum levels we should have. This all stems from knowing we have everything we need when we want it – we’ve done enough checks on aircraft over the years, so we have a good idea about what we’re going to see when it’s in the bay and try to purchase as much material parts as we need in advance, so we’re ready to go.”

But it’s not only the supply issues of the more traditional aircraft parts that Caerdav are monitoring. The increase in the use of composite on commercial aircraft has seen the company already see this as an opportunity, as Pitts-Robinson explains: “We’ve got our in-house composite guys who are experienced and will be adding another reasonably soon. So, we can handle most composite items we need, from the wing to belly, including floorboards, fairing or flying controls. This means we can control our turnaround times better, as we no longer have to put that part in a van and send it to London or Scotland for repair. Additionally, we’ve saved ourselves





money and time for the customer.

"It's an area we can see increasing, which is why we're going to increase manpower internally. Composite parts will play a greater role in aircraft and we need to be part of that. But we don't deal with aircraft with composite fuselages at the moment."

Across Caerdav, it's clear that every decision regarding the company's growth has been given a lot of thought, and the investment and development have been steady and exceptionally well planned. The result is an MRO company that has gained an exceptional reputation and its insights and plans are set only to enhance this.

Looking ahead, Pitts-Robinson explains further the goals he's already outlined for the company: "It's about growth for us. With the additional third line in November, that means more people – and we have the Cardiff Airport job, and we hope that will increase work-wise."

"When we talk to our current and potential customers, their fleets are growing exponentially in the next five to ten years, and it's kind of a challenge to try and match that in with what we can offer. From where we were a year ago, we will be 50% bigger with the third line, and it's something that will continue in the year to come. I can say that the introduction of the neo and the MAX, from the Caerdav perspective, will help with the growth."

Caerdav's apprenticeship programme is critical to its ability to grow. When the first cohort gained their qualifications, chairman Bruce Dickinson (best known as lead singer of Iron Maiden) presented all nine apprentices with full-time

CLOCKWISE FROM ABOVE:

Caerdav's team are experienced in all kinds of aircraft modification, from standard interior LOPA changes to bespoke STC completion

Airlines and lessors are searching for available maintenance slots for their aircraft, and demand is far outstripping what MRO companies can supply at present. The demand for trained qualified personnel is a key focus point for Caerdav moving forward

Caerdav clients can choose from a range of refurbishment, end-of-lease and end-of-life transition maintenance alongside general care and maintenance programmes

The apprentice programme continues to expand every year. The first cohort of Caerdav graduates have all received a full-time contract with the company and started working on the lines

contracts, none of whom knew they would get.

“Our second group of 16 apprenticeships are two years away from qualifying, and they started in September 2023. And towards the end of this year, up to another 20 will be taken on to start their training in partnership with ICAT [International Centre for Aerospace Training] based at Cardiff Airport,” says Pitts-Robinson.

Beyond the MRO, Caerdav also has an aviation consultancy support and advice team that can offer advice on setting up

a new airline, operational expansion, or restructuring for an operator. Although Pitts-Robinson is keen to point out that it’s not the mainstay of the business, it does make the best use of the impressive network of contacts that Caerdav team has built up over the last ten to 20 years.

Perhaps the most famous client to date is Buffalo Airways, which in 2023 was seeking to upgrade their World War Two-era DC-3 fleet with a Boeing 737-400F. Utilising Caerdav’s consultancy service, the airline gained access to the team’s extensive list of industry contacts

With a 6,000ft ILS runway and parking for up to 20 narrow-bodied airliners at St Athan, Caerdav has everything in place to increase its work schedule later this year and into 2025 and beyond





“To see where we are now, as a business looking to increase capacity by 50% next year, is a fantastic journey to be part of”

Chris Coleman, managing director, Caerdav



and experience, which helped source a suitable aircraft and broker a competitive deal for its purchase. They assisted Buffalo Airways with the pre-purchase inspection, providing a detailed report on the 737's condition and highlighting potential issues before the sale was finalised.

Coleman's view of Caerdav echoes that of his commercial director in many ways: “We're one of the only truly independent MRO companies in the UK, and I think what we have done over the last couple of years has certainly put us in the top tier of MROs within Europe. We pride ourselves on the service we provide customers, which has been reflected in the feedback we have received regarding our reliability. A customer base is crying out for us to expand with them. We're keen to keep the growth organic and ensure that we meet customer needs in a controlled manner. It's too easy to get carried away in the MRO sector.”

In terms of how the sector has changed in the last few years, Coleman states: “I think the sector has always been an airline's world, but now it's slowly shifting to the MRO market and the tide has changed slightly. There's significant demand and insufficient capacity, whereas it was the opposite in the past. And this is reflected in the winter season, which is great for us. But it's the supply chain that has taken the biggest knock post-pandemic. We've reacted to this and increased our preferred suppliers, ensuring we've got enough reach to put Caerdav at the top of their list.”

In terms of the company's target, Coleman adds: “It's growth in my view; we've got the core foundation of a great company and now the work is focussing on strategic planning and having three lines at St Athan that provide that quality service while growing. Keeping that methodical approach and running that risk analysis as a management team. So, when we take it to three, four, five or even six lines, we do it in that same controlled and safe manner.”

Caerdav's plans in its current facility will allow four lines to be established when the global supply chain issue is resolved. Coleman says: “It's difficult to see an end in sight [to this] anytime

soon, purely because of the demand. I don't think COVID-19 was the only factor. The market has also increased so much that companies may have fallen behind that curve without the pandemic. And now, with those two factors in mind, many companies are trying to work their way back.

“When we entered the winter season last year in September, certain parts had lead times of April the following year, whereas usually you can get them in a couple of weeks. I think it's because everybody, including the major corporations, went out and front-loaded stock in order to de-risk their business, which has not helped matters either. Items are purchased directly off the production line, whereas usually, they'd be on a shelf.

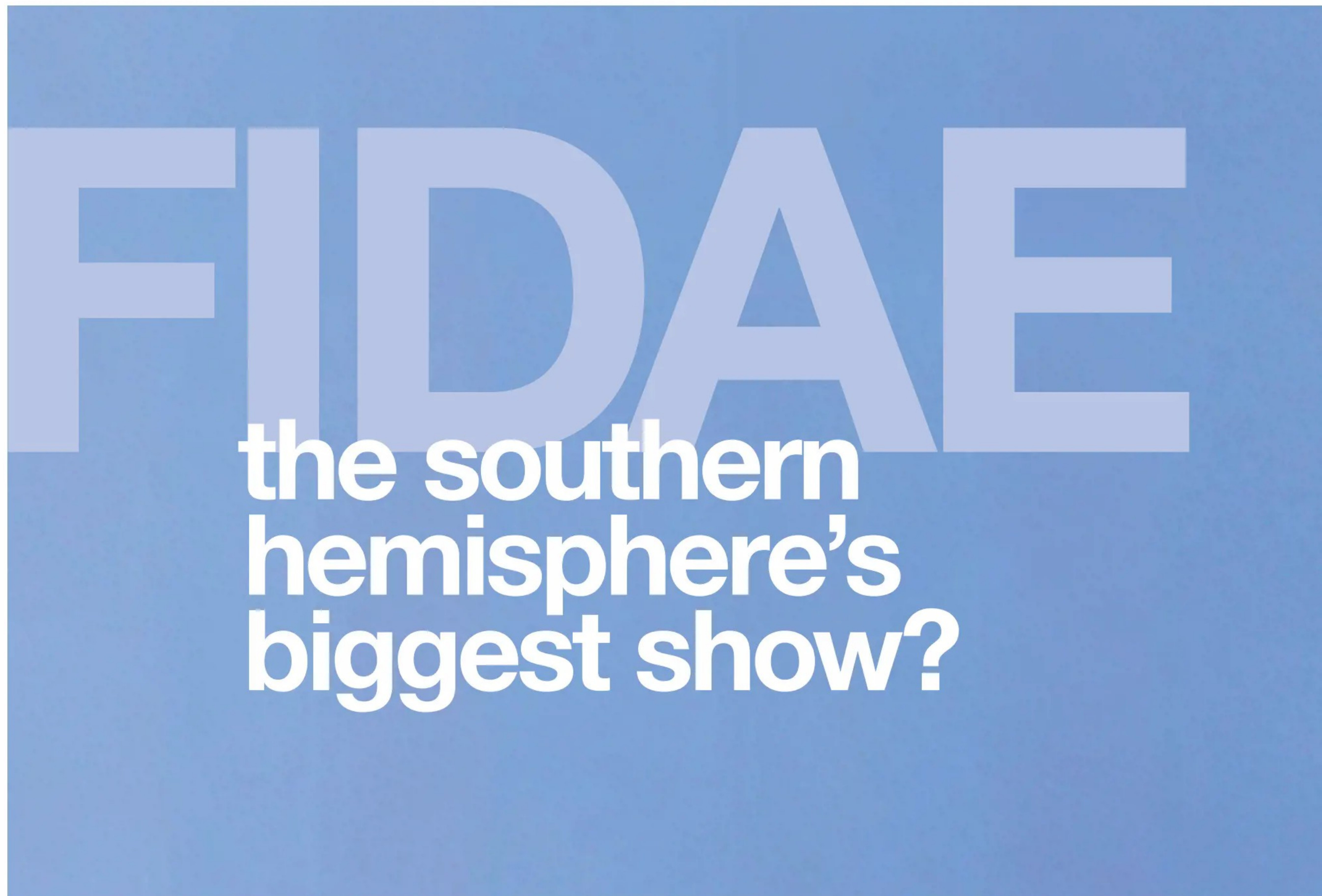
“I'd be surprised if next winter we don't have any supply chain issues, but I'd like to think by winter 2025/2026, there will be far fewer issues in this area.”

It's evident that Coleman and Pitts-Robinson are deeply committed to driving Caerdav's continuous growth within the MRO sector. “Being on the journey we are on as a business, every day is exciting and add to this the physical growth of the company in terms of staff, it shows how much more we can do as a company on the line maintenance side of things. We're just adding more and more strings to the bow,” says Pitts-Robinson.

Coleman adds: “To see where we are now, as a business looking to increase capacity by 50% next year, is a fantastic journey to be part of. None of it would have been possible without the commitment and hard work of our team.

“Being owned by a celebrity rock star may have its attraction for employees at Caerdav, and when Bruce does come in, you can see he's extremely passionate about aviation and is an integral part of the team,” Pitts-Robinson adds. “Bruce regularly goes for a walk around the hangar and talks to everybody, having time to stop and discuss aviation.

“It's still a people business at the end of the day; while technology is coming along massively making things easier, that person-to-person connection still makes the industry work.” **AI**



the southern hemisphere's biggest show?





Latin America's aviation industry is booming, with numerous aircraft OEMs keen to establish regional links. **Jon Lake** provides an overview of the latest show

The 23rd edition of the biennial FIDAE (Feria Internacional del Aire y del Espacio) International Air and Space Fair was held in Santiago, Chile, from Tuesday, April 9 to Sunday, April 14. FIDAE is Latin America's largest and most important aeronautical and space fair and perhaps the whole southern hemisphere too. Like many international air shows, FIDAE consists of a trade show throughout the week, followed by a public air show at the weekend.

This year more than 50 countries participated, with 420 exhibiting companies, more than 600 delegations, and more than 3,000 scheduled meetings, all held across the 15,604m² of exhibition space. There were also some 115 aircraft to grab the attention of the more than 1,500 accredited media visitors.

The show included companies drawn from all sectors – civil and commercial

aviation, defence, homeland security, unmanned aerial vehicles (UAVs) and remotely piloted aircraft systems (RPAS), aircraft maintenance, airport equipment and services, and space technology.

The first Feria Internacional del Aire show, FIDA'80, was held in 1980 and the show was renamed FIDAE from its sixth iteration, FIDAE'90.

The 21st show, FIDAE 2020, was cancelled due to the COVID-19 pandemic. Still, the exhibition bounced back in 2022, albeit without the Russian participation that had become traditional, cancelled as a result of the invasion of Ukraine.

The first show was held to celebrate the 50th anniversary of the Chilean Air Force, and the Fuerza Aérea de Chile (FACH) has been a strong supporter of the event ever since.

The show is held at Santiago/Comodoro Arturo Merino Benítez International Airport (Base Aerea Pudahuel), the home of II Brigada Aérea, whose Grupo de Aviación N°10 operates the Bell 412EP, and examples of the ➔

ABOVE:

Currently, the backbone of the Chilean Air Force, the F-16C Block 50 flew a daily high-energy display at the show, once again showing off the impressive manoeuvrability of the fighter

FIDAE

OPPOSITE:

A panoramic view of the main static park at this year's FIDAE 2024

Airbus

Pillán II at FIDAE



FIDAE 2024 offered the National Aeronautics Company of Chile (ENAER) the chance to highlight recent developments in the US\$142m Sistema de Entrenamiento Integrado para Pilotos Militares (Integrated Training System for Military Pilots) programme, under which the company is developing the Pillán II basic trainer.

The Pillán II was launched at the last FIDAE in 2022 with an initial order for 33 aircraft from the Chilean Air Force (FACH). The new aircraft will replace around 30 surviving T-35 Pillán training aircraft. Since then, several potential customers in Latin America and the Middle East have formally submitted requests for proposals (RFP) to ENAER.

The original T-35 Pillán (PA-28R-300 Pillán) was developed by Piper Aircraft in the United States as a two-seat military trainer for assembly in Chile, using a fuselage derived from that of the PA-32R (Lance/Saratoga) with a new centre section and wing, and stressed for aerobatics. The type was powered by a 300hp Textron Lycoming AEIO-540-K1K5 six-cylinder horizontally opposed piston engine. The first XBT prototype made its maiden flight at Lakeland on March 6, 1981, followed by a second YBT prototype on August 31 that year. An initial 123 kits were delivered, though the production eventually reached 154 aircraft, delivered to Chile (80), Spain (41 as the E.26 Tamiz) plus the Dominican Republic, Ecuador, El Salvador, Guatemala, Panama and Paraguay.

The decision to embark on developing and producing an indigenous trainer design was taken only after consideration was given to procuring an off-the-shelf aircraft from a foreign manufacturer. ENAER chief executive Henry Cleveland explained that the decision to proceed with the Pillán II was made “in order both to preserve and to build up the industrial and technological capacities of ENAER and other firms in Chile’s local industry”.

Previous efforts to develop advanced versions of the original Pillán included the design of a new wing and even a turboprop version, the T-35T Aucan, which flew in prototype form. The new Pillán II will be powered by a piston engine for cost reasons and lower fuel consumption, but it will have a new four-bladed propeller.

The Pillán II, incorporating aerodynamic improvements and significant use of composites, showcases the cutting-edge technology that ENAER is bringing to the aviation industry. However, its main defining characteristic will be an advanced glass cockpit and avionics suite, providing a more representative cockpit environment for trainees destined to progress to fly modern tactical aircraft. This technological leap will impress and intrigue aviation professionals and potential customers.

The aircraft will form part of an Integrated Flight Training System for the Chilean Air Force, including synthetic training devices. Desarrollo de Tecnologías y Sistemas (DTS), an ENAER subsidiary, is already developing these elements.

VIP-configured Boeing 737-330QC, 737-58N and 767-300, and Gulfstream GIV, as well as the C-130B/H Hercules, KC-135E Stratotanker, and the EB-707-385C Cóndor, and E-3D Sentry. Co-located Grupo de Aviación N°9 operates a variety of MH-60M, Bell 206B, Bell 412EP and Bell UH-1H helicopters. The Servicio Aerofotogramétrico operates the DHC-6-100, G-IVSP and LR-35A from the same base.

For FIDAE 2024, the Chilean Air Force provided most of the aircraft in the large static display and all five FACH brigades participated in the show. Highlights included two of the three Boeing E-3D Sentry aircraft acquired from the UK in 2022 (one in the static, one flying – the other having been bought for spares), as well as the Phalcon-equipped EB-707-385C Cóndor that the Sentries are to replace. The Chilean Air Force also



provided flying displays by the F-16C, the F-5E Tiger III, the A-29 Super Tucano, the DHC-6 Twin Otter and the MH-60M Black Hawk, Bell UH-1H and Bell 412 helicopters, and the Escuadrilla de Alta Acrobacia 'Halcones' – the Chilean Air Force's Display Team, flying the Extra 300L.

The Chilean Air Federation (FEDACH) co-ordinated the participation of several local aerobatic display teams. These included the RV Team Chile which displayed a pair of home-built Van aircraft (an RV-7 flown by Hernán Santibáñez and an RV-8 flown by Fernando Abasolo, flying a display meticulously designed by César Falistocco, the technical director of RV Team Chile. The Villarrica Team consisted of a pair of Aerotek Pitts S2As, flown by Karam Puali and Vaslav Rubeska. Another Chilean pilot, Mijali Proestakis, who flew the first civil Extra 300L in Chile, displayed his XtremeAir XA42.

There were several foreign participants in the flying display, too, including the Embraer EMB-314 Tucanos of the Brazilian Air Force's Esquadrilha da Fumaça (Smoke Squadron), as well as the United States Air Force's F-22 Raptor Demonstration Team, whose commander, USAF Captain Samuel 'RaZZ' Larson, Raptor Demonstration Team commander gave a polished display of fast jet aerobatics which left many spectators open-mouthed! The team's two F-22As (one a spare) were accompanied by a KC-10 Extender tanker, making one of the type's final deployments to South America.

FIDAE also served as something of a festival of parachuting, with displays by the FACH Boinas Azules (Blue Berets) Parachute Team, the USAF Wings of Blue team, and the Colombian Air Force Águila de Gules team.

Beyond the flying and parachute



BELOW:

A view of the flying display participants at FIDAE 2024 illustrates the cross-section of types present in this year's show

Airbus



"This year more than 50 countries participated, with 420 exhibiting companies, more than 600 delegations, and more than 3,000 scheduled meetings"

displays, more serious business was being done behind the scenes. On a geopolitical level, FIDAE provided a platform for the US and Chile to strengthen their relationship and to highlight and showcase the enduring promise, commitment and partnership between Chile and the US Air Force, the US Space Force, and US Southern Command. US Air Force Maj Gen Julian C. Cheater, assistant deputy undersecretary of the Air Force for international affairs and US Ambassador to Chile Bernadette Meehan were on hand for meetings, not least with Chilean Air Force commander-in-chief General Hugo Rodriguez Gonzalez. There were also visiting aircraft from Argentina (a C-130 Hercules), Brazil (a C295 and a KC-390), and most unusually, from the Dominican Republic.

The Fuerza Aérea de República Dominicana (FARD, Dominican Republic Air Force) dispatched the first of ten locally assembled TP-75 Dulus kit planes. The

aircraft is a sub-scale 'Tucano-Replica' produced by the Flying Legend Company, powered by a Rotax piston engine.

The first two aircraft were officially handed over to the President of the Dominican Republic at San Isidro Air Base, east of the capital, Santo Domingo, on December 9, 2023. Lt Col Amin Díaz Mercedes left San Isidro Air Base on March 31. They made stops in Anguilla, Barbados, Guyana, Brazil, Paraguay, and Argentina before arriving in Chile after a 5,000nm journey that took 48 hours.

The FARD will use the TP-75 for training and reconnaissance missions, supplementing three surviving ENAER T-35 Pilláns.

As a major trade show, FIDAE also provided an invaluable platform for companies to meet their Latin American customers and local and regional suppliers to show off their wares and host a packed conference agenda.

Local company ENAER (Empresa Nacional de Aeronáutica) displayed

the first FACH KC-130R to have been modernised with the installation of new eight-bladed Collins Aerospace NP-2000 composite propellers similar to those fitted to the C-130J Super Hercules. These promise a "reduction of vibration and interior noise while improving propeller speed and synchronisation maintenance" and "improving performance by increasing power and reliability while reducing maintenance times and costs by around 50%".

FIDAE is more than just a platform for selling into the Chilean market. Boeing is understood to have been marketing the P-8 Poseidon to Brazil. At the same time, Sikorsky executive Adam Schierholz told a local magazine that his company was promoting the Blackhawk helicopter to Brazil, seeking to sell 12 to the army, four to the air force, and an unknown number to the navy. Turkish Aerospace Industries (TAI) reportedly offered to transfer UAV and aircraft production technology and assembly capabilities to South American nations.





Return of the MAX

FIDAE provided the backdrop for a low-key but welcome return of Boeing airliners to the trade show circuit after being absent in Singapore. A Boeing 737 MAX 8 of the ultra-low-cost airline and flag carrier of the Dominican Republic, Arajet, was on static display, along with a 787-900 from the Chilean LATAM Airlines Group. These aircraft appeared alongside an Airbus A350-900 of Delta Airlines.

FIDAE 2024 emphasised space, hosting a space summit and the third meeting of the IILA (Italo-Latin American International Organization) Space Agencies. The

organisation's member nations comprise Brazil, Chile, Costa Rica, the Dominican Republic, Ecuador, Italy, Panama, Paraguay, Peru, Uruguay, and Venezuela.

On Wednesday, April 10, astronaut and former NASA Space Shuttle commander Mike Bloomfield addressed a conference at FIDAE, and he was followed by former Italian Space Agency astronaut Maj Gen Roberto Vittori the following day. Bloomfield began his career as a USAF F-15 pilot before becoming a NASA astronaut in December 1994. Bloomfield was the pilot of the space shuttle Atlantis for the STS-86 mission in 1997, then flew Endeavour for the

STS-97 mission in 2000, and Atlantis again for 2002's STS-110 mission. He recalled: "To fly safely into space, I studied the shuttle cockpit manual for over a year." Bloomfield is an ambassador for the Endeavour Scholarship programme, promoting Science, Technology, Engineering and Mathematics (STEM) education.

Vittori is one of the most experienced European astronauts, a former pilot on the F-104 Starfighter, Tornado IDS and Mirage 2000. He was selected as an astronaut in July 1998 and participated in three space missions (Soyuz TM-34 in 2002, Soyuz TMA-6 in 2005 and STS-134 in 2011). **AI**

CLOCKWISE FROM TOP RIGHT:

The Escuadrilla de Alta Acrobacia 'Halcones' – the Chilean Air Force's Display Team flew every day at the show with a dramatic routine of formation flying and solo aerobatics

FIDAE

Providing a splash of colour to the static park was this DHC-6-300 Twin Otter operated by the Chilean Air Force in Antarctica

FIDAE

Two of the three ex-RAF Boeing E-3D Sentries, purchased in 2022 were present at FIDAE 2024. One example took part in the flying display; the other was positioned within the static park. The Sentry has replaced the Boeing EC-707C Condor AEW&C platform

FIDAE

Rising to the occasion

Will the reality match the hype in the emerging eVTOL market segment?

Mark Broadbent reports



Advanced air mobility (AAM), a new air transportation system using revolutionary aircraft designed to move people and cargo between places previously not served or underserved by aviation, has been on the cards since 2016. Billions in investment from private equity and venture capitalists has poured in as special purpose acquisition companies funded bold ambitions for electric vertical take-off and landing (eVTOL) air taxis.

Airbus, Boeing and Embraer have all entered the fray, with the segment even drawing OEMs from the automotive sector,

such as Hyundai. Orders were placed for hundreds of examples of eVTOL aircraft at an embryonic design stage. The feverish investment settled in 2022/23, with attention turning towards practical issues: technology development, testing/certification and regulatory and infrastructure requirements.

As SMG Consulting noted: “[AAM is] a complex ecosystem made of many parts – ie, vehicles, infrastructure, operators, MROs – that must be concurrently developed and deployed to lead to the industry’s success.”

Archer and Joby

When SMG looked ahead to the market’s prospects late in 2023, it noted: “2024 will be a crucial year for the frontrunner ➔



Archer Aviation recently signed a framework agreement with Abu Dhabi authorities for in-country manufacturing
Archer Aviation



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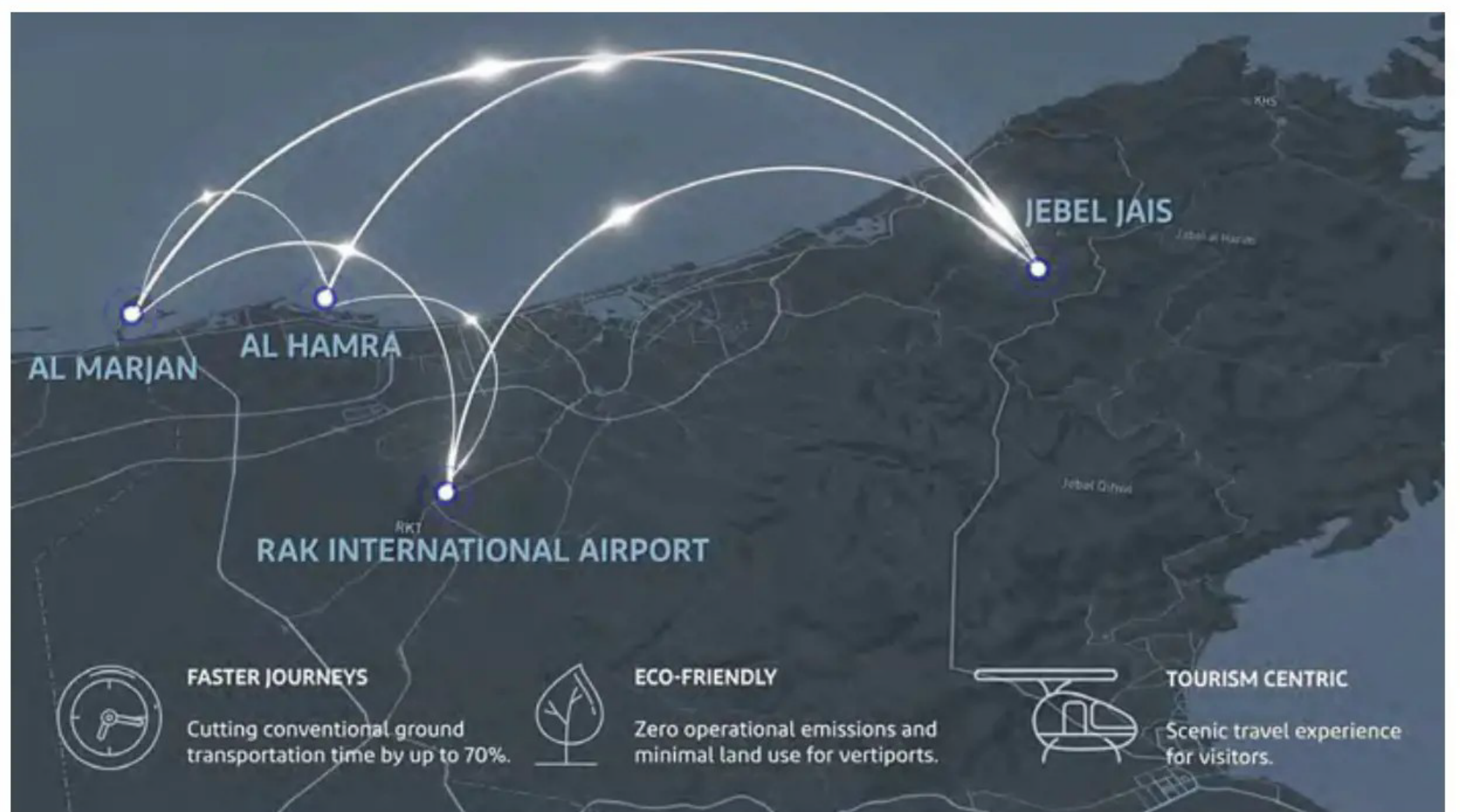
eVTOL OEMs working on the public rollout of their air taxi services”.

Archer Aviation and Joby Aviation are two such pioneers in the US. In August 2023, Archer received a US Federal Aviation Administration (FAA) agreement to begin piloted ‘for credit’ testing towards certification of its production eVTOL, named Midnight, “in early 2024”. Midnight is an evolution of Archer’s earlier demonstrator eVTOL, the Maker.

However, in early May 2024, Archer had yet to begin piloted flight testing. SMG Consulting’s AAM Reality Index (ARI), which tracks critical projects, predicts a mid-2024 first piloted flight and type certification/service entry in 2025.

SMG predicts a similar timeline for Santa Cruz, California-based Joby Aviation, which completed its pre-production flight test programme in May 2024. Over four years, two aircraft undertook more than 1,500 flights (including more than 100 with a pilot onboard). This included a demo in New York City in November 2023, operating from that Manhattan Downtown Heliport over the Hudson River. Joby is now preparing to start piloted for-credit testing with two production prototypes, and it recently broke ground on a production line in Marina, California.

In April 2024, the Civil Aviation Administration of China awarded EHang a



production certificate for its autonomous EH216-S, which the company plans to use for tourism flights in Chinese cities.

Other developers

Typically, eVTOL systems are multicopters like the E216-S or tiltrotors like the Archer and Joby vehicles. BETA Technologies has taken a different approach with its ALIA aircraft, which has both a fixed-wing CTOL (conventional take-off and landing) variant and an eVTOL.

In April 2024, BETA said that its ALIA 250 eVTOL had completed a first manned,

full transition from vertical to forward flight at Plattsburgh Airport in New York. According to the latest SMG Consulting AAM Reality Index, ALIA is on course to achieve service entry in 2025/26.

The USAF has assessed BETA, Archer and Joby aircraft under the AFWERX Agility Prime programme to accelerate AAM development and explore military cargo/passenger transport applications for eVTOLs.

Lilium was set to unveil the first full-scale example of its Lilium Jet at EBACE in Geneva, Switzerland at the end



CLOCKWISE FROM LEFT:
There are several agreements to develop advanced air mobility infrastructure in the Gulf states

Skyports Infrastructure and authorities in Ras Al Khaimah signed agreements on developing advanced air mobility in April 2024

Using existing infrastructure to accelerate progress is the plan to set up the UK's first vertiport testbed at Bicester Airfield in Oxfordshire

Plans for a network of vertiports to support air taxi services in the Ras Al Khaimah emirate have recently been announced All images Skyports Infrastructure





of May 2024. The German company recently started producing the first high-performance battery packs for its aircraft, the first jet-powered eVTOL. It intends to bring its aircraft to market in 2025.

Chinese company Autoflight said in April 2024 that it had delivered the first demonstrator of its Prosperity five-seater eVTOL to a customer in Japan. A statement read: “The operator, to be identified in due course, is currently developing plans for unmanned demonstration eVTOL flights at the 2025 Osaka World Expo, as well as a wider AAM rollout in Japan.”

Brazil’s Embraer offshoot Eve expects type certification in 2025, while British company Vertical Aerospace has a longer-term outlook, expecting type certification for its in-development VX4 production eVTOL in 2028.

‘Tremendous progress’

Sapan Shah, product director of AAM at Honeywell Aerospace Technologies, told *Air International*: “Tremendous progress is enabling the promise of AAM. We’re past the ‘if this will happen’ and are into the ‘when’ – it’s not a decade away.”

Honeywell products and services for eVTOLs include a fly-by-wire system with redundant architecture to simplify flight controls. Shah explained: “By allowing pilots to input commands without directly manipulating control surfaces or motors – which would be impossible based on many of these vehicle designs – this lightweight system enhances both safety and usability. It provides envelope protection and is designed to meet certification standards in both the US [under FAA regulations] and Europe [under European Union Aviation Safety Agency (EASA)], ensuring broad applicability and compliance.”

Shah said Honeywell’s Anthem next-generation avionics suite is ideal for AAM,

having been “crafted specifically for a new generation of pilots who expect simplicity and user-friendliness akin to consumer electronics.” He believes Honeywell’s high-integrity navigation sensors – designed to ensure precise navigation and safe landings, even in GPS-denied settings – address a fundamental technical challenge facing eVTOLs: operations in densely populated urban environments. He said: “Our ground control station initiative is setting a new standard for remote vehicle supervision. This certifiable, vehicle-agnostic station allows operators to effectively monitor and manage remotely piloted vehicles, ensuring safety and reliability from the ground.”

Honeywell is supplying various eVTOL developers, such as the avionics, a redundant triplex fly-by-wire system, high-integrity sensors, thermal management systems and motor position sensors for Lilium’s vehicle. Similarly, Pipistrel uses Honeywell fly-by-wire systems, navigation sensors and satellite communication technology. Archer uses its flight control actuation and thermal management systems. And the company supplies avionics, a ground control station and sensors for Hyundai’s eVTOL offshoot Supernal, as well as avionics, sensors and flight controls for Vertical Aerospace.

Technology transfer

Sapan Shah acknowledged that there are many hurdles to be surmounted by the emerging AAM sector: “One of the most critical is managing weight. Keeping vehicle weight low is essential to making the operations viable. Another key demand from our customers is the need for avionics and flight control systems that are simple and intuitive. The multiple flight control surfaces and motors of eVTOLs, especially during transition phases, represent a complex challenge.



Our solutions are designed to simplify operation and [control] multiple systems.”

Denesz Thiyagarajan, senior analyst of general aviation and engines at the IBA consultancy, highlights another technical challenge: “In the eVTOL world, range is everything, especially where it looks to compete between helicopters and ground transport. The need to improve lithium-ion batteries is paramount, as longer ranges increase the capability and efficiency of eVTOL functions. As research and development continue, an effort is being made to improve the energy density of lithium-ion batteries even further. Meeting stringent environmental standards and passing rigorous safety tests are imperative for aerospace battery packs. There has been a surge in funding and investment towards battery technology as the need for storage solutions surges. IBA expects improvements in battery technology in the coming years.”

Honeywell’s Shah said the anticipated expansion of eVTOL operations means ensuring products can be “manufactured at scale, maintaining affordability and ease of production.” This presents another challenge: “We anticipate the need to produce aerospace equipment on a scale not previously seen.”

Honeywell is drawing on technological innovation from other sectors, as Shah revealed: “For instance, the actuation systems we have developed for eVTOLs are directly influenced by our decades of experience with mission-critical flight actuation systems, which have accumulated billions of hours of operational reliability in some of the most demanding environments. Our thermal management solutions for companies like Archer and Lilium utilise Honeywell’s advanced micro vapour cycle systems, which utilise technology found on aircraft such as the F-22. This system ➔

LEFT:
Joby Aviation is preparing to start piloted for-credit testing with two production prototypes and recently broke ground on a production line in Marina, California
Joby Aviation

BELOW:
Joby Aviation completed its pre-production flight test programme in May 2024
Joby Aviation



incorporates Solstice refrigerant, a product sourced from another Honeywell business unit, showcasing our ability to integrate and innovate across different technological spectrums.”

For Shah, transferring proven technologies means eVTOLs “are not only innovative but are supported by time-tested, reliable technologies that enhance their performance and safety. And this also goes both ways. The baseline technology fuelling innovation for the AAM market is a perfect sandbox to perfect and move into GA, regional and eventually larger air transport aircraft.”

Infrastructure

Developing infrastructure is another issue for companies working in the nascent AAM age. Both the FAA and EASA have published guidelines for vertiports that cover construction, charging equipment, access and operational procedures. However, IBA’s Thiyagarajan foresees “minimal infrastructure progress in the upcoming year, given the unresolved complexities in legal matters concerning power/charging sources [and] airspace, among others.” Initial eVTOL operations, he noted, “will have to utilise existing infrastructure, alongside [the] current regulatory and operational framework, though this would need to be adapted the more frequent eVTOL operations become.”

Sergio Cecutta, founder and partner at SMG Consulting, told *AIR International*: “All the OEMs are working on reusing the existing infrastructure, whether it is a helipad or an airport. [Scaling up] will not happen till the latter years of this decade.”

A recent example of industry players using existing infrastructure to accelerate progress is the plan to set up the UK’s first vertiport testbed at Bicester Airfield in Oxfordshire, which involves Skyports Infrastructure and Vertical Aerospace.

Certification

Considering the broader regulatory picture, Sapan Shah from Honeywell said: “The industry puts a lot of effort into defining the means of compliance through various standard development organisations, including RTCA, ASTM and EUROCAE. Industries must collaborate in these forums to share knowledge globally and avoid duplicating efforts for the same standards.”

IBA’s Thiyagarajan pointed out that “navigating regulatory hurdles has been a challenge” for the AAM segment, given that the FAA and EASA have yet to establish exact certification procedures for eVTOLs. He said: “Having no defined policies has somewhat impeded the progress of eVTOL development.”

Initially, developers were designing eVTOLs under FAA Federal Aviation Regulations Part 23, Part 21.17(a) with special conditions. Then in May 2022 the FAA decided that winged eVTOLs



– including tiltrotor designs – would be certified under a separate category, Part 21.17(b). This decision meant entirely new regulations would have to be written for eVTOLs, so developers had to push back their schedules for the first piloted test flights initially planned for 2023.

IBA’s Thiyagarajan observed: “Many OEMs have set optimistic timelines for certification, which have proven challenging to meet given the complexities of regulatory processes and technological development. IBA thinks that eVTOLs will only see approvals in the next five years or so. Regulatory bodies have not progressed much over the past year, as safety precautions remain a priority. OEMs are fully aware that safety takes precedence, and it’s essential to ensure that all necessary precautions are meticulously followed, given the novelty of this vehicle type.”

‘More efforts needed’

Nevertheless, there has been some progress. Joby recently completed a third of the FAA-type certification process, and the FAA published the final airworthiness criteria for Joby, which Sergio Cecutta from SMG Consulting described as “a concrete step.” Similarly, Archer has obtained FAA Part 145 certification for eVTOL maintenance, repair and overhaul. Cecutta said there is “mutual recognition” between EASA and FAA of each other’s work on eVTOLs: “Both EASA and the FAA are putting the finishing touches on their respective regulations, with the final version expected towards the end of 2024 or beginning of 2025.”

However, IBA’s Thiyagarajan said that “more efforts are needed.” He said it is vital that the FAA and EASA collaborate on regulatory standards to promote safety, efficiency, international cooperation



and a streamlined certification process.

Sapan Shah agreed: “Domestically, a defined path to both aircraft certification and operation still has questions. Globally, a lack of harmonisation across authorities is concerning. Safety remains the foremost priority in the certification process. Given the innovative technologies incorporated into these aircraft, certifying them presents unique challenges. Harmonising the certification basis between the FAA and EASA is crucial to ensure consistency.”

Cecutta believes the pace of regulatory progress means “it might be possible that we will see certification for the US OEMs slip into early to mid-2026.”

In April 2024, the European Commission adopted secondary legislation on drones and vertical take-off and landing-capable aircraft, putting in place what a statement called “the final rules” for the launch of AAM. Based on EASA regulatory

November 2023 report, SMG Consulting said the timing of VoloCity’s type certification had slipped from the second quarter of 2024 to mid-2024 and that type certification was “pushed as late as possible to start in time for the Olympics,” which run from July 26 to August 11.

At the time of writing in May 2024, it was still being determined whether Volocopter would meet the target. The latest public statement, released two months earlier, explained that the company had become an Approved Training Organisation for eVTOL pilot licenses. However, the statement merely said an Air Operator Certificate “is expected later this year.”

Cucetta told *Air International* that, in SMG’s view, Volocopter is “very close to having a conforming aircraft [and is] waiting for a supplier to provide the conforming part needed” and that certification at the end of the year “is still possible.” However,

CLOCKWISE FROM TOP LEFT:

BETA Technologies’ ALIA completed the first manned, full transition from vertical to forward flight earlier in 2024

BETA Technologies

Archer Aviation has yet to begin piloted flight testing of its Midnight eVTOL

Archer Aviation

Volocopter recently became an Approved Training Organisation for eVTOL pilot licenses

Volocopter



proposals, the legislation introduces comprehensive requirements for piloted electric air taxis spanning air operations, flight crew licensing, rules of the air and air traffic management. The EC emphasised: “The package is the last legislative element required for the launch of air taxi services, complementing other existing legislation. Air taxis will also require EASA certification before such services can become operational in Europe.”

Volocopter

Air International reported that the German developer Volocopter plans to operate the first public eVTOL passenger flights in Europe in the summer of 2024, using its four-seat VoloCity eVTOL in Paris during the forthcoming Olympic Games. In a

it does look increasingly unlikely that VoloCity air taxis will be flying passengers in Parisian skies this summer.

As this article was being written, the *Financial Times* reported that Volocopter was in talks with existing and new European-based investors to seek additional funding after failing to secure €100m in loans from the Baden-Württemberg and Bavarian state governments. The article quoted Volocopter CEO Dirk Hoke: “It shows that we [in Europe] are great at innovation but struggle on the way to commercialisation.”

The report acknowledged: “The setback for Volocopter comes at a critical time for the nascent air taxi industry. Challenges to fund expensive development and test-flight programmes and difficulties in getting ➤

regulatory certification have repeatedly forced companies to push back key milestones.”

International push

Sluggish infrastructure development and protracted regulatory approval in Europe and the US have led various developers to pursue opportunities in other regions. Sapan Shah noted: “Regions like the Middle East and India have already signed agreements with vehicle OEMs and are expected to experience rapid growth in eVTOL operations, potentially outpacing even the developments in the US and Europe. This expectation is backed by recent strategic announcements aimed at launching the eVTOL operations within these regions.”

project in the UAE, “further highlighting the region’s commitment to driving AAM adoption and Skyports’ role in enabling it.” Earlier in 2024, the company signed an agreement with the Roads and Transport Authority of Dubai and Joby to launch air taxi services in Dubai.

Pushing into Middle East markets is a sign of pragmatism. The capital markets that made hefty investments in AAM will seek to realise gains. As Thiyagarajan put it: “Investors are eager for returns.”

He said investors in AAM understand that the segment “requires a long-term approach. IBA maintains the view that numerous eVTOL players will likely consolidate to secure funding and maintain viability. As the market matures, companies may find themselves



Honeywell is supplying numerous eVTOL developers with avionics and control systems
Honeywell

During the April 2024 DRIFTx mobility event at the Yas Marina Circuit in Abu Dhabi, Joby Aviation signed a multilateral memorandum of understanding with authorities in the emirate to establish and scale air taxi services, including potential inter-emirate services between Abu Dhabi and Dubai. Meanwhile, Archer Aviation signed a framework agreement with Abu Dhabi authorities for in-country manufacturing, operations and training. Joby and Archer are planning commercial air taxi operations in the UAE in the next few years.

In May 2024, Skyports Infrastructure announced a memorandum of understanding with the Ras Al Khaimah Transport Authority and Ras Al Khaimah Tourism Development Authority to introduce a network of vertiports to support air taxi services in the emirate by 2027. Skyports noted that this is the company’s latest

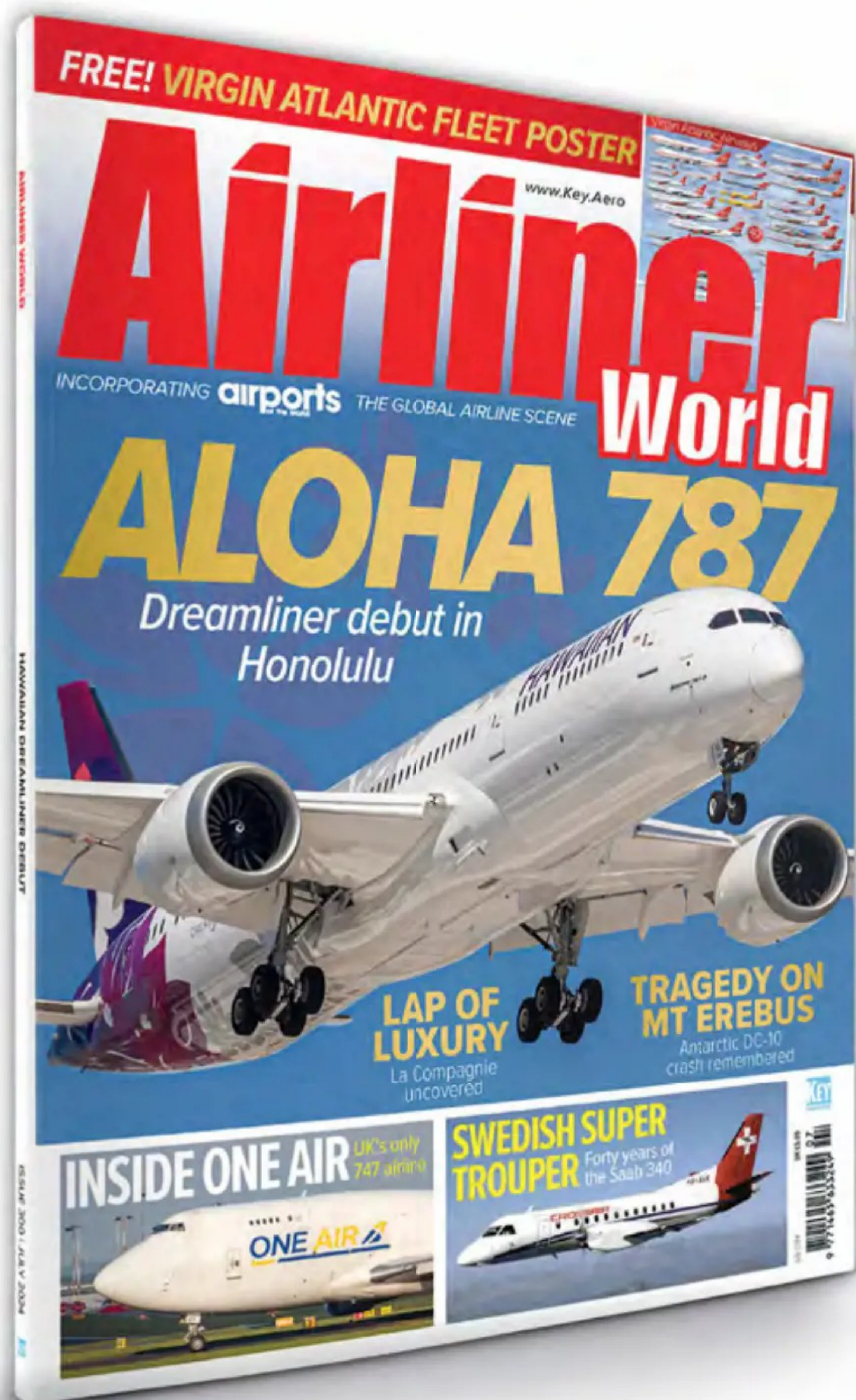
compelled to merge, gaining insight into which technologies, designs and business models are most viable. Consolidation often results in the thinning out of less viable companies, leading to a more streamlined and competitive landscape.”

Public acceptance is also part of the eVTOL market’s evolution. Honeywell’s Shah said: “As drone-based deliveries become more commonplace in urban areas globally, they naturally raise awareness and discussions around AAM. This increase in visibility is expected to drive greater educational efforts and acceptance of eVTOL technologies within the general community.”

IBA’s Thiyagarajan concurred: “Enhancing public acceptance of eVTOLs remains a critical priority, requiring increased awareness and societal integration efforts.” **AI**

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“A lot of safety officers are keen to do more and lean on people like the software vendors and consultants”

Paul Saunders, senior director of product management,
Vistair/Comply 365



Formulating a first-rate safety factor



Safety management systems help organisations to administer their activities more efficiently.

Bernie Baldwin learns from some key practitioners how best practices are achieved

"Safety is no accident!" It's a phrase that has been quoted on many occasions within the aviation industry. Its double meaning covers the goal itself and

the fact that meeting the goal does not simply happen fortuitously. Little wonder, then, that as aircraft become increasingly sophisticated, safety management systems (SMSs) also develop to ensure the highest level of safety possible.

The European Aviation Safety Agency (EASA) states that safety management "seeks to proactively identify hazards and mitigate the related safety risks before they result in aviation accidents and incidents." It also notes that "when an organisation has a clear understanding of its role and contribution to aviation safety, it can prioritise safety risks and more effectively manage its resources and obtain optimal results."

According to the US Federal Aviation Administration (FAA), the major components of an SMS are "safety policy, safety risk management, safety assurance and safety promotion (safety culture)." Alan Barnes, business development and operations manager at aviation-based software company ELMS Aviation, said: "Any robust safety culture is seeded, created, nurtured and embraced from within the organisation. In my experience,

for far too long, aviation has focused on meeting the baseline requirements of any regulations and/or local legislation and little else."

Barnes explained the best ways an airline can incorporate those components into its operations: "The regulations set out the framework for any organisation to seed a good and effective safety culture. However, for a robust safety culture, all staff should be empowered to provide input, working collectively to define the specifics. This ensures the 'buy in' of all and delivers maximum effectiveness within the operation."

He noted that the process can differ between geographical regions: "There are significant differences, for example, in the FAA regulations regarding safety management and competence when compared to the EASA regulations. The needs for SMS, staff competence and so on, all differ in their respective approaches."

Firas Sallam is an instructor and aviation safety, quality and training expert at Aeroclass.org, a training organisation whose mission is to "make premium-quality aviation training accessible, helping leaders support their teams and hit KPIs, and enabling students and professionals to further their careers." He has IATA Certified Safety Instructor status and began specialising in safety improvements in 2017. ➔

Vistair customer easyJet has a safety culture from the cockpit to the hangar floor and beyond
easyJet/Airbus



On implementing the FAA's four major SMS components at an airline, he broke down the rationale behind each: "The integration of SMS components into airline operations is not just a regulatory requirement, but a strategic approach to cultivating a safer aviation environment. Each component serves as a pillar.

"Safety policy is the foundation. Airlines should develop clear safety policies endorsed by top management, reflecting the organisation's commitment to safety as its utmost priority. This must be a 'living' document, regularly amended and improved to address risks and challenges. For instance, after the crash of Flight 38 in 2008, British Airways revamped its safety policy to include more rigorous engine testing and pilot training, highlighting how policies must evolve from lessons learned.

"Safety risk management involves identifying hazards and managing risks.

It is vital to implement a robust reporting system where pilots, crew and other staff can report incidents without fear of retribution. The best approach to risk management emphasises continuous monitoring and pre-emptive action, which will be instrumental in improving a record with high safety standards.

"On safety assurance, airlines must continually monitor and assess the performance of their operations. This can be done through regular audits and leveraging flight operations data to improve practices. Flight data monitoring (FDM) programmes are a testament to how airlines can successfully enhance their safety assurance practices.

"Finally, with regard to safety promotion, creating a culture that promotes safety is crucial. Airlines should invest in ongoing training and communication to ensure that safety remains at the forefront of every

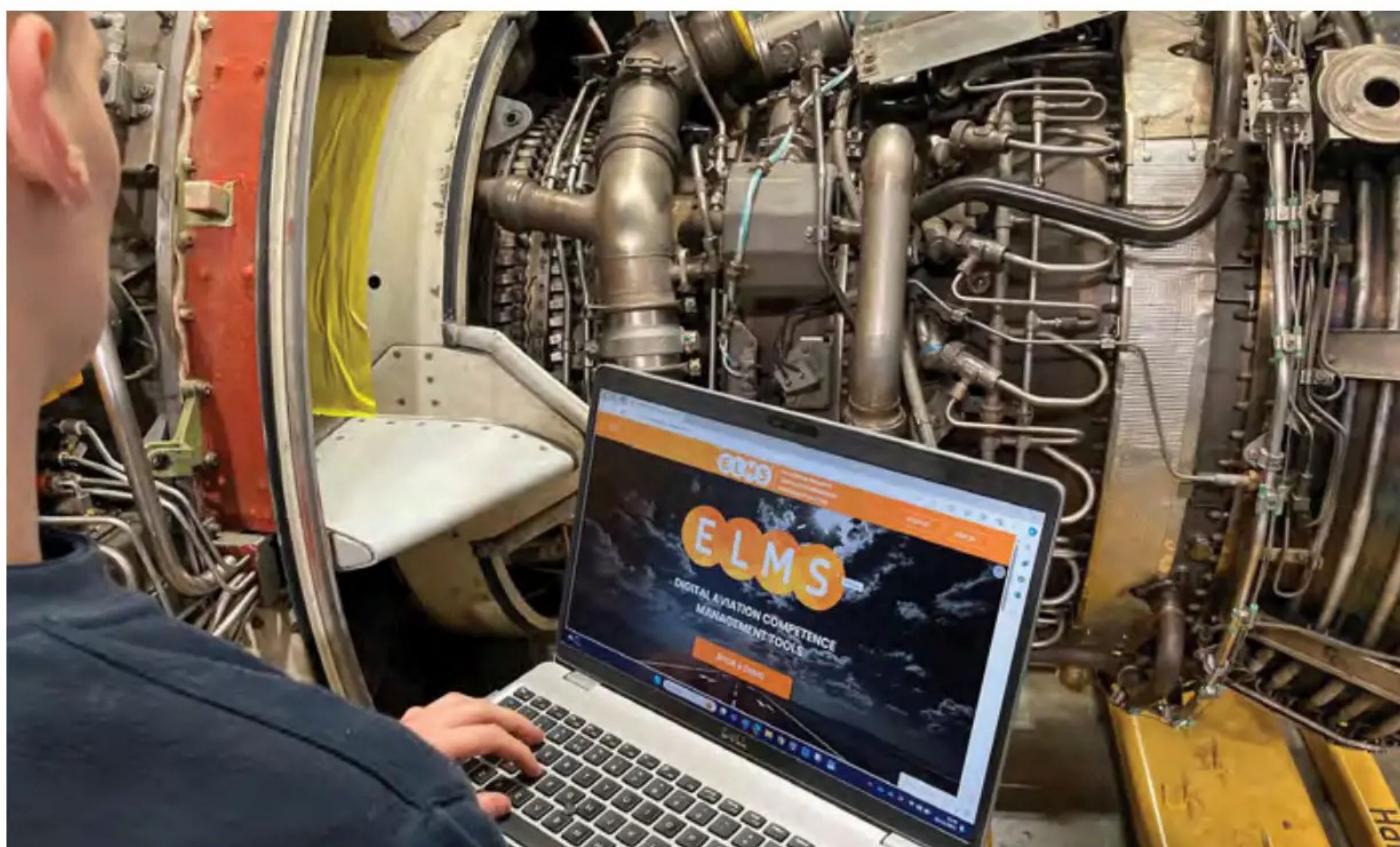
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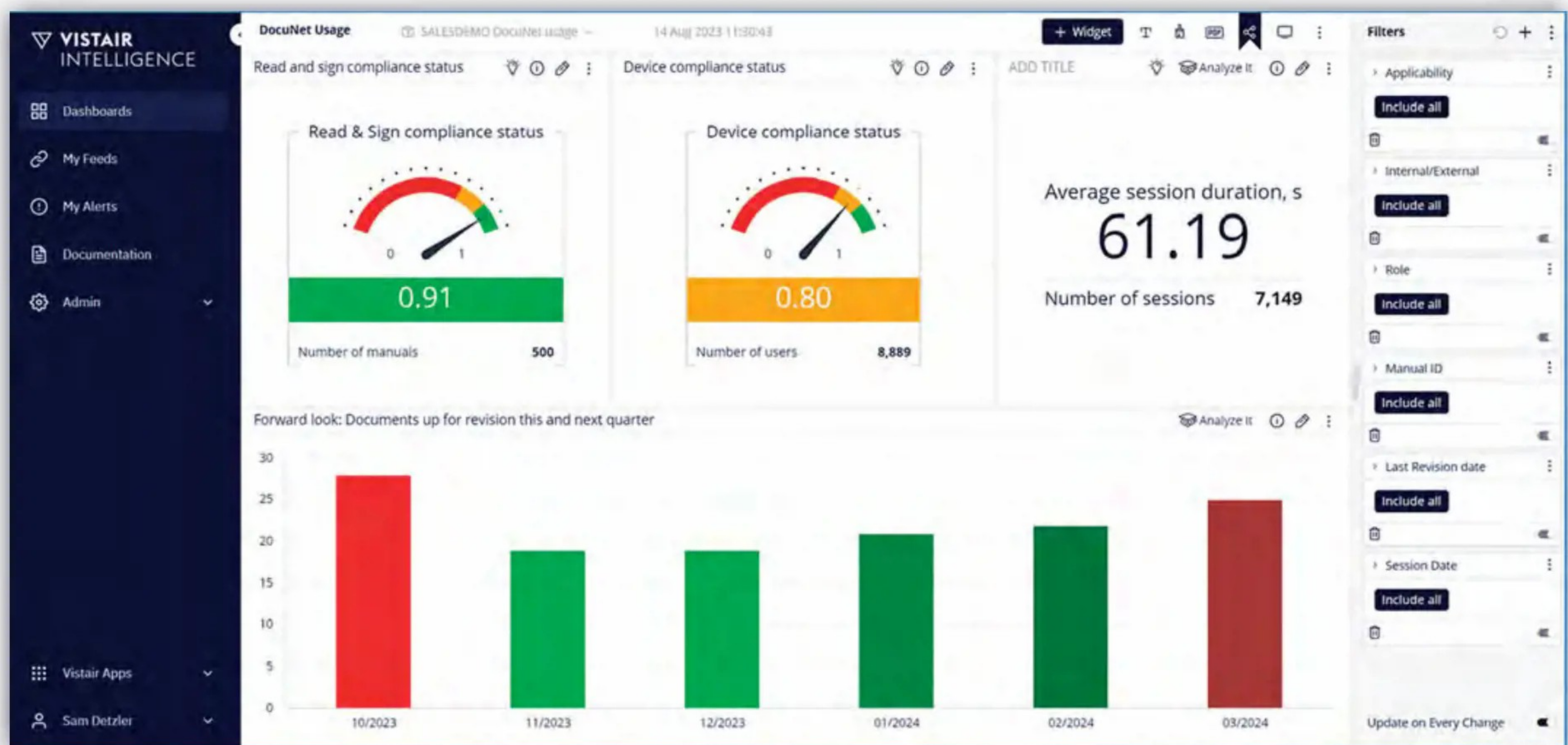
Sallam acknowledged that SMS implementation can vary significantly by region and is influenced by local regulations, the maturity of the aviation sector and cultural aspects: "In the EU, for example, EASA regulations provide a structured framework for SMS, which is tightly integrated with European safety directives. In contrast, in some developing regions, the implementation may face challenges due to limited resources or less stringent regulatory oversight. However, the principles of ICAO's Annex 19 are designed to be globally applicable, ensuring that basic safety management standards can be adopted universally."

Paul Saunders is senior director of product management at Vistair/Comply 365, two companies currently undergoing a merger to create "a leading global provider of compliance, safety and data intelligence technologies." He agrees that SMS adoption can differ according to regulatory jurisdiction: "If we take the FAA alone, then they're some way behind EASA in terms of implementing and mandating safety regulations across different areas of regulatory approval. Also, there are different mandated requirements for scheduled commercial airlines versus non-scheduled operators."

SMS implementation is also required for MRO providers, with EASA introducing mandates: "If you are an operator, you have to demonstrate that not only are your own Part 145 and Part CAMO covered by an SMS, but if you are outsourcing to a third party, you have to demonstrate that it covers them too. It's a shifting landscape."

On the FAA's four major SMS components, he pointed to ICAO and IATA





standards that set out what a safety policy looks like, how safety reporting and safety assurance are conducted and how you risk management is carried out: “What the regulators look to see you do is to be conformant with those particular standards. A lot of safety officers are keen to do more and lean on people like the software vendors and consultants, saying ‘I don’t want just a box-ticking exercise to pass my audit, I actually want to treat this as a differentiator, I want to be potentially a world leader or have a very strong reputation’.

“People are looking to continually improve, approve and analyse their results, and continually make data-informed decisions and learn from their peers. It’s actually an area where there’s a

lot of collaboration. Our customers tend to know each other from all the conferences and talk to each other regularly, so they’ll always bounce ideas off each other. They’re very happy to share best practice, share learnings and continually innovate for safety.”

Achieving regulatory compliance for an SMS requires investment in personnel, with key roles in staff structure needing to be fulfilled. Saunders explained: “This differs with the way that an airline organises itself. We see a blend of people who are 100% designated, and somewhere it’s potentially still a licensed pilot, and this is a role that they participate in part-time. Both of those scenarios can work well.

CLOCKWISE FROM TOP:
The hangar is one of the key areas where an effective SMS is vital
 MAEL

Vistair Intelligence is a pioneering platform that combines data from any source. It comes loaded with a comprehensive range of powerful investigative tools that allow aviation professionals to drill deep down into data for actionable insights
 Vistair

The ELMS solution provides a valuable element to many organisations’ safety management systems
 ELMS Aviation



“We also see sort of a breakdown divided by AOC, where there’s a mimicking of positions in each of the companies in a group, often overseen from the parent company. In the US, multi-AOC is quite rare, but they sometimes have a similar breakdown at a departmental level.

“The Asia Pacific isn’t a region where we’ve worked much, but it’s a growing market for us. Their regulatory frameworks are still emerging, but they tend to follow either EASA or the FAA, so it’s a kind of transposed set of scenarios. There are a few subtle nuances in terms of distribution mechanisms, reporting mechanisms and those kinds of things. [Both there and in the Middle East] we’re quite aligned with the regulators. We see the same kind of personnel who similarly organise their regulations. If we get an inquiry from a territory we’ve not dealt with before, we never see anything outlandish that we wouldn’t have seen before.”

ELMS Aviation’s Barnes agrees on putting money into personnel while adding further recommendations: “There is most definitely direct investment involved – in hiring a safety manager, for example – but that is just the tip of the iceberg. The real and arguably more significant investment comes from everyone within the organisation. It’s not a

direct cost, but more indirect investment from all involved through their ‘buy-in’ to the safety culture. An effective leader can endorse a robust safety culture from the top down, but to achieve and maintain that culture, it must be driven upward from the foundation.”

Firas Sallam at Aeroclass believes an effective SMS requires a diverse team with clear responsibilities: “First is the safety manager, who is responsible for the overall management and effectiveness of the SMS. Then a compliance manager is needed to ensure the airline meets all regulatory requirements. Then comes the training manager, who develops and implements programmes that support the SMS and promotes a strong safety culture.”

Continuing on the staff training element and what needs to be carried out so that each person appreciates how their role fits into the SMS, Sallam said: “Training should be comprehensive and tailored to each role. It should cover not only the technical aspects of the SMS but also safety culture. Everyone from the executives to the ground crew should understand how their actions can influence safety outcomes and be trained to recognise and report safety threats. An example to draw from would be the crew resource management (CRM) training that evolved significantly after the Tenerife

airport disaster in 1977, emphasising the importance of communication and teamwork.”

Sallam noted the value of safety promotion training: “This is focused on building and sustaining a positive safety culture. It includes workshops and seminars that encourage open communication, emphasise the importance of reporting safety concerns and teach strategies for personal accountability in safety. These training programmes should not be seen as standalone efforts, but as parts of an integrated approach to developing a comprehensive safety culture.”

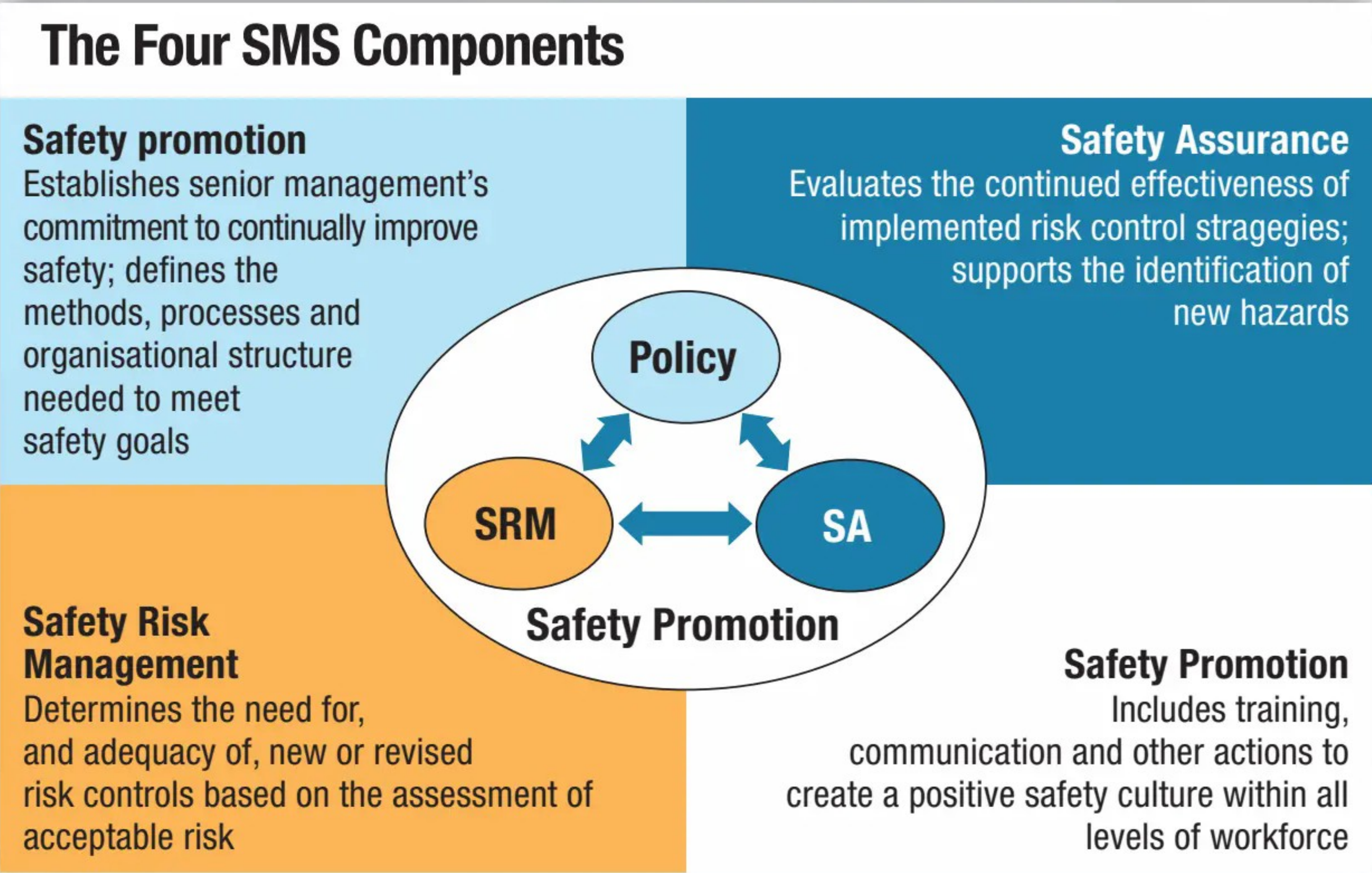
At Vistair/Comply 365, Saunders approaches the question of staff training from the supplier side: “From a technical point of view, what we expect as software vendors is that when a new platform is rolled out, there is technical training, but we also see it as part of our job and part of the service that we want to provide software that is as intuitive as possible.

“You often hear from a developer perspective that if you have delivered software that needs training or documentation, there is sometimes a perception that you have perhaps failed in that effort. They pride themselves on having super simple yet sophisticated and intuitive software that needs minimal

CLOCKWISE FROM LEFT:
Management must foster a safety culture to make the SMS an easy ‘buy in’ for all personnel
Aerviva

The four major components of a SMS, as defined by the the US Federal Aviation Administration
FAA

Mobile device usage for SMS work can range from smartphones, tablets and laptop computers
BAE Systems



quite sexy things that we've been able to work on, which we believe are innovative and unique."

Alan Barnes believes that training starts with the concept and defines the culture that an organisation requires concerning aviation requirements: "Training, coaching, leading, empowering are far more effective headings that deliver better success. Often, training is precise and taken very literally. However, this is a subject that is extremely broad; it's more akin to learning a new language, and if you approach it in this way, you can build a much more robust and sound safety culture."

As for the use of IT to aid an SMS, he argues that many existing products place less focus than perhaps is necessary on supporting the staff within organisations: "In some cases, spreadsheets and other paper-based methods are still being used and presented as suitable. These don't provide efficient oversight for leadership or any form of engagement with the individuals involved – they are simply ineffective. Through digital methods, there is a massive opportunity to change this, which is exactly what a tool like The ELMS Solution has been designed to do."

"If we take ELMS and the element of SMS and aviation regulating relating to staff as an example, the organisation has the ability to set the baseline core competences for every individual in an empowering and interactive digital format. ELMS provides a complete solution that's intuitive and easy to use, providing a powerful tool that ensures managerial hierarchy is configured, managed, respected and controlled."

"The system allows the leadership teams to create a high-level 'live' dashboard view of their organisation. From there, individuals within the business are able to fully engage in supporting the organisation, with easy access to their qualifications, competences, career biography, training and succession pathways. This transparency empowers users to participate in, and fully embrace, the culture of the organisation – a truly game-changing approach compared to some of the more traditional methods."

Aeroclass's Sallam identifies data collection and analysis as a critical



training. That's certainly true with what we provide, but what we always talk about with our customers is that they treat new software as a change agent when they want to update their processes.

"I remember when quality was the domain of the quality assurance department and customer service was the domain of the customer service department. Attitudes have shifted to where the onus now – the accountability and the responsibility – falls on everybody. And obviously, we've seen the same shift around safety. It's not the responsibility of the safety office to provide safety.

it's to provide best practice, training, dissemination, optimisation and making data-informed decisions around those things, but it's everybody's responsibility to provide the safety and integrity on which the industry is built."

IT applications such as those from Vistair/Comply 365 and ELMS aid the work of a safety management system. Saunders commented on the areas in which these are being deployed to increase the fidelity of the overall system: "The most obvious area in which those systems are deployed at an end user level is via mobile devices. It's probably only been in the last ten to 15 years where a mobile device in the hands of individual workers has become the norm. It started in the cockpit with EFBs, moved into the cabin where cabin crew have got personal digital devices, and then came to the ground crew, the MRO tech ops crew. The accessibility of those devices is now available as an offline asynchronous kind of data capture capability and becoming more and more the norm."

On Vistair/Comply 365 developments, Saunders reported that the company is "a couple of years into the journey of creating the fourth generation of the SafetyNet product" and is scheduled to go live with its first major customer during the second half of 2024: "There are some

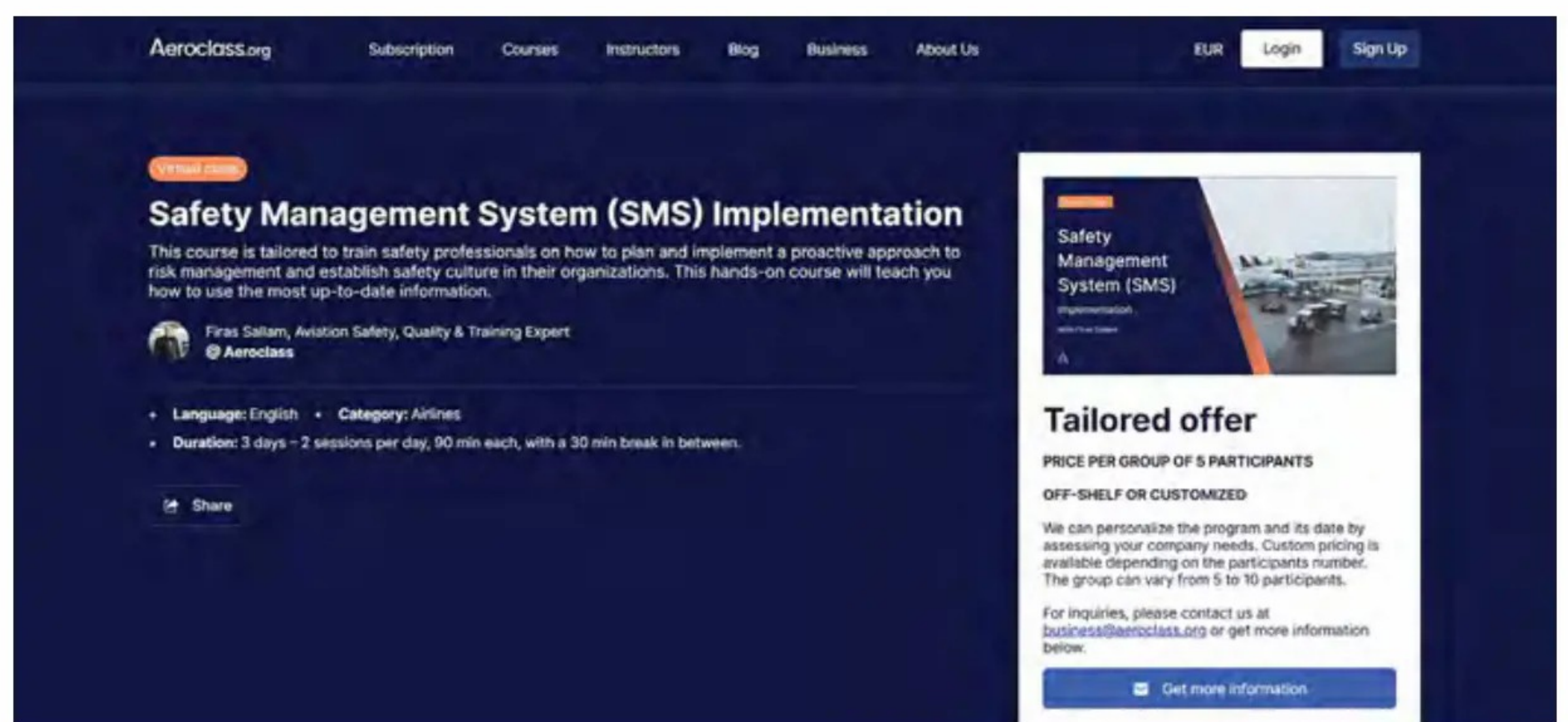


“Efficient incident reporting systems are vital for a proactive safety management approach”

Firas Sallam,
instructor and aviation
safety, quality and training
expert, Aeroclass.org

RIGHT:
Aeroclass offers a range of SMS courses
Aeroclass

BOTTOM:
Firas Sallam notes that after the crash of Flight 38 in 2008, British Airways revamped its safety policy to include more rigorous engine testing and pilot training
NATS



area where IT systems help with SMS effectiveness: “Advanced IT tools play a crucial role in the continuous improvement of safety standards. For example, flight data monitoring (FDM) collects and analyses data from flight operations to identify deviations from standard operating procedures or unexpected events. FDM monitors parameters such as altitude, speed and engine performance to detect potential safety issues before they lead to incidents. Alongside that is predictive analytics, which can forecast potential failures and safety lapses. This approach can be

implemented in predictive maintenance schedules that helped reduce downtime and prevent in-flight issues. Then there are health monitoring systems, which are crucial for real-time monitoring of aircraft systems’ health, predicting component failures before they occur.

“Efficient incident reporting systems are vital for a proactive safety management approach. Automated reporting tools allow staff to report safety issues quickly and efficiently, ensuring that data is captured in real-time and fed directly into the SMS. With the ubiquity of smartphones, several airlines have

developed mobile apps that enable staff to report safety issues on the go. These often include features for uploading photos or videos, making the reports more comprehensive and easier to assess.”

The resulting output from the collected and analysed data can then be synthesised into actionable insights. According to Sallam, these are typically presented through dashboards, safety metrics and trend reports, alert systems, heat maps and graphical representations: “These outputs are integral in not only maintaining compliance with safety regulations, but also in fostering a culture of continuous improvement and proactive risk management. By leveraging IT applications, airlines can enhance their capability to predict potential issues, respond faster to incidents, and manage risks more effectively, improving overall safety and operational efficiency.

“Adding to these points, it’s essential to remember that the ultimate goal of an SMS is to foster an organisational culture where safety is ingrained in every action and decision. It’s not merely about compliance, but about exceeding standards to ensure the safety and trust of passengers and crew alike.”

In other words, safety is no accident. **AI**



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Mediation

an attractive mechanism

In May 2004, the US filed a case at the World Trade Organisation (WTO) against the European Union (EU), arguing that the bloc was illegally subsidising the European aircraft manufacturer Airbus. The claim related to the entire family of Airbus products – A300 through A380 – and included specific launch aid for the A340 and A380 and the provision of research and development loans and grants in support of large civil aircraft (LCA) development directly for the benefit of Airbus. The complaint would herald the start of the longest trade dispute in the history of

the WTO, with the EU filing a complaint against the US in May 2005 for its unlawful support to Boeing.

Over the subsequent 17 years of the Airbus-Boeing dispute and following WTO decisions, both the US and the EU imposed punitive tariffs on each other's exports, including 15% on aircraft, affecting a total value of \$11.5bn of trade between the two sides. As a result, EU and US businesses have had to pay more than \$3.3bn in duties.

In June 2021, three months after the EU and the US agreed on a temporary mutual suspension of all tariffs related to

the disputes for four months, both parties finally decided upon an 'Understanding on a co-operative framework for large civil aircraft'. In addition to agreeing to suspend the application of their countermeasures (tariffs) for five years, both sides vowed to seek to "overcome long-standing differences to avoid future litigation and preserve a level playing field between the aircraft manufacturers and work to prevent new differences from arising."

Speaking at the time, European Commission Executive Vice-President Valdis Dombrovskis said: "With this agreement, we are grounding the



The Airbus A380 was at the heart of Boeing's claims against Airbus over alleged unfair subsidies via government loans.

Airbus

Aviation disputes don't have to reach litigation or arbitration to be resolved. As **Alex Preston** discovers, aggrieved parties are increasingly turning to mediation



Airbus-Boeing dispute. It proves that the transatlantic relationship is moving to the next level and that we can work with the US to tackle long-running disputes. We now have time and space to find a lasting solution through our new Working Group on Aircraft.”

Complex web

Aviation is, by its very nature, an international and multifaceted industry. It covers a range of products and services, from aircraft to airlines to airports, and an ecosystem of myriad OEMs and suppliers, ranging from large multinational entities to small family-run companies. Aviation is also a highly regulated industry, with all stakeholders subject to aviation, international and commercial law.

As Héctor Fernández (AFALEGAL SC) points out, writing on the *Kluwers Arbitration* blog of the Netherlands-based Kluwer Law International, the WTO establishes rules and procedures. It also provides a forum for resolving trade disputes between its member countries and arbitration is offered by the WTO Dispute Settlement Body.



ABOVE:
The Hague CAA was launched during the 2022 Farnborough AirShow by Founder and Chairperson, Paul Jebely, Global Head of Aviation and Marine at the Hong Kong offices of Withers.
Hague CCA/Farnborough.com

MAIN IMAGE:
The Hague CCA is administered by the Netherlands Arbitration Institute in the Hague, Netherlands.
US Embassy, The Hague

Other institutions that offer industrial mediation services include the more recently established American Arbitration Association-International Centre for Dispute Resolution AAA-ICDR Aerospace, Aviation, and National Security Panel, launched in November 2016, as well as the Shanghai International Aviation Court of Arbitration (SIACA), established in June 2014, and the Hague Court of Arbitration for Aviation (Hague CAA), which opened in July 2022. Another is the Singapore International Mediation Centre (SIMC), an independent, not-for-profit organisation



dedicated to meeting the evolving business needs of cross-border commercial disputes.

Singapore support

“We believe that opportunities for commercial partnerships exist even amid a dispute,” an SIMC spokesperson told *Air International*. “We provide a platform for innovative, sustainable solutions that leverage our distinctive expertise in dispute management to potentially turn disputes into new deals to meet the commercial interest of parties.”

SIMC works across multiple

“We believe that opportunities for commercial partnerships exist even amid a dispute”

SIMC spokesperson



jurisdictions, covering common and civil law traditions to promote effective dispute resolution through professional case management under SIMC Mediation Rules, as well as providing training in mediation and mediation advocacy skills and think leadership. It was established on November 5, 2014, following the recommendations of a working group convened by Chief Justice Sundaresh Menon and the Ministry of Law. The group aimed to develop Singapore into a hub for international commercial mediation by providing services for parties in cross-border commercial disputes,

particularly those doing business in Asia.

The SIMC spokesperson explained that the working group that prepared the report recognised that the growth of trade and investment in Asia had “significantly enhanced the need for dispute resolution services, especially for cross-border commercial disputes.” Singapore set out to develop an “entire suite of dispute resolution services”, including court litigation, international arbitration and mediation in international commercial contracts.

The spokesperson continued: “At the same time, there have been growing

concerns among users of international arbitration about the increasing time and costs involved in arbitration and a desire to improve the efficiency of international dispute resolution. Encouragement of mediation is one way to meet these concerns. This combination of a need for more dispute resolution services in Asia and a desire to promote efficient processes led to the creation of the SIMC.”

Aviation-related disputes can take various forms – such as disputes involving leasing, manufacturing or maintenance servicing, financing, sales and delivery, and aircraft operational contracts – ➔

and not all of them are as high-profile or drawn out as the Airbus-Boeing dispute.

The medium of mediation

“Parties can choose to mediate at any time,” said the SIMC representative. “This can be before arbitration or court litigation has begun or in the midst of such proceedings.

“If arbitration or litigation has begun, the mediation may run at the same time or the formal proceedings may be stayed for a short period for the mediation to be completed. Commencing mediation earlier could

non-confrontational setting to facilitate the parties’ discussions and to assist them in negotiating a mutually acceptable settlement. The mediator helps parties find solutions that meet their respective interests and concerns instead of determining who is at fault in a dispute: “A good mediator is a patient listener who can understand the underlying concerns of each party, find common ground between them



MAIN IMAGE:
Experts agree that the aviation industry is particularly suited to adopting mediation in its dispute resolution process.
EpicTop10.com

BELOW:
The Airbus-Boeing dispute was the longest dispute overseen by the World Trade Organisation (WTO).
EU Commission



potentially reduce or even totally avoid the legal costs involved in arbitration or litigation if the mediation results in a settlement agreement. In addition, tensions tend to escalate over time when there is a dispute, making a settlement harder to achieve the longer a mediation is delayed. Even when parties have tried to negotiate directly for some time without any success, mediation could potentially break the deadlock because parties in mediation can share with the mediator information on a confidential basis that they might not be prepared to share with the other party because of the erosion of trust between parties. This allows the mediator to find common ground between the parties that would not be apparent to the parties during their direct negotiations.”
The role of a mediator is to provide a

and then help them to generate forward-looking creative solutions that address their respective interest and concerns.”
SMIC has about 60 international and specialist mediators who have listed aviation as one of their dispute sectors. Its international mediators have extensive experience resolving cross-border disputes and are known to have delivered successful outcomes in complex, high-stakes commercial disputes.
In his blog article, Héctor Fernández concluded: “International aviation

arbitration will only become more frequent as it has become the subject of the standard dispute resolution clause included in contracts within the general aviation industry and has achieved fruitful results in practice.”

Resolution remedy

According to the SIMC, mediation is structured negotiation between parties facilitated by a neutral and third party: “In SIMC-administered mediations, the mediator is not the same person adjudicating in any parallel proceedings (in court or before an arbitration tribunal) involving the dispute between the parties.”

The organisation stresses that mediation is voluntary and that all

one meetings with the mediator: “The mediator will encourage the parties to consider their legal rights and address their respective fundamental interests and concerns that underpin their dispute. The focus in the mediation is on the future – ie, the best way forward for the parties in their mutual interests – rather than on what has already happened.”

Unlike a judge or an arbitrator, a mediator is not empowered to make any ruling or award on the dispute. Instead, the outcome is in the parties’ hands: “Whether there is a settlement agreement at the end of the mediation depends entirely on the parties’ decision. Should there be a settlement from the mediation, the terms of the settlement are generated by and agreed to by the parties on their own volition with the advice of their lawyers, should they be legally represented, and not imposed on them by the mediator. However, if the parties agree and so request, the mediator can also be asked to provide a neutral evaluation of their respective positions. However, such an evaluation would still not be legally binding on the parties.”

Mediation can last about one month and can be even as short as one week if the parties are prepared to prioritise it. About 90% of mediations administered by SIMC take only a day.

Mediation matters

While Héctor Fernández may feel that “practicing international arbitration in this multi-trillion-dollar industry may be worth considering”, what are the attractions to the parties involved?

The benefits of mediation are numerous:

- **Neutrality and confidentiality**
Mediation is highly suited for disputes involving matters that parties would rather not be made public, such as employment disputes and allegations of professional negligence.
- **Parties have full control over the dispute’s outcome**
Mediation eliminates the uncertainty of outcomes prevalent in arbitration and litigation.
- **A non-adversarial and flexible nature**
Mediations can potentially preserve the relationship between the disputing parties. This is particularly valuable when parties are involved in many other commercial transactions that they still wish to work on or there is a strong likelihood of future opportunities for



“No party can be compelled to attend a mediation. The mediations are confidential and conducted on a ‘without prejudice’ basis, so that should the mediation not result in a settlement agreement, the parties’ rights would not be prejudiced in any subsequent arbitration or litigation proceedings.”

A mediation usually takes place in a neutral location. It will involve joint meetings between the parties and the mediator, as well as private one-to-

MOU Signing

between

Hague Court of Arbitration for Aviation & Singapore International Mediation Centre

Asia's first specialised commercial dispute resolution mechanism
for mediation in the aviation industry

Wednesday 21 Feb



ABOVE:
MOU Signing at Singapore Airshow between Hague CAA and SIMC to collaborate on Asia's first specialised mediation framework for the aviation industry. (Left to Right): Paul Ng, Co-Chair of the Mediation Standing Committee of the Hague CAA and Chuan Wee Meng, CEO of SIMC.
SIMC

BOTTOM RIGHT:
The headquarters of the Singapore International Mediation Centre. Singapore is a leading international commercial alternative dispute resolution hub for the region and globally.
Maxwell Chambers

them to work together.

- **Time and cost savings** Most mediations require only one day. As such, mediation levels the playing field for individuals with limited means engaged in disputes with large organisations with much stronger financial power, thus avoiding a war of attrition. In some cases, resolving the dispute quickly may also be more critical, even if one party seems to have the stronger legal case, as this may take years to be proven through arbitration or litigation and avoids any uncertainty or risk in the final outcome. Even if mediation does not result in a settlement, it only adds marginally to the cost of arbitration or litigation.

- **Allows for creative non-legal solutions** Mediated disputes are often resolved through innovative solutions that address each party's interests beyond their legal rights. If there is no settlement in the mediation, parties can proceed with another form of dispute resolution, such as arbitration or litigation. Sometimes, while there is no full settlement of a dispute, there is a partial settlement, leaving the remaining unsettled issues to be resolved through arbitration or litigation. This reduces the time and costs

required in the subsequent proceedings.

According to the SIMC spokesperson: "In a successful mediation, no party feels like a loser, and each party feels that they have reached a resolution they can live with since the terms of the settlement agreement are by mutual agreement. The cost of the mediation is usually shared equally.

"A successful mediation not only preserves but also repairs the parties' relationships for future mutually beneficial dealings. It can also, in some instances, 'expand the pie' available for distribution between the parties, resulting in a win-win situation for both."

Over the years, SIMC has had an average settlement rate of around 70%. Even if mediation results in only a partial settlement, there are many instances where some issues in dispute have been resolved, leaving less to be addressed through arbitration or litigation. By allowing the parties to speak face-to-face, mediation can help to crystallise the issues (including non-legal topics) that are most critical from each party's perspectives: "In a sense, there are no unsuccessful mediations, as even those that do not result in a settlement

agreement can often benefit the parties. Some mediations may not result in a settlement at the end of the session but have helped parties be open to exploring options that result in a settlement at a later stage.”

International co-operation

The Netherlands Arbitration Institute was the principal drafter of the specialised, efficient and transparent 2023 Hague CAA Arbitration Rules launched at the Farnborough International Airshow in July 2022. In January 2024, the first Hague Court of Arbitration for Aviation Conference brought together more than 100 aviation industry experts and dispute-resolution specialists from around the world to discuss the complexities of topics such as contractual dispute resolution within the global aviation industry, critical examinations of aviation case law, the role of investor-state arbitration in aviation and the evolving roles in specialised arbitration and mediation.

During the Singapore Airshow in February 2024, the Hague Court of Arbitration for Aviation (Hague CAA) and the SIMC signed a memorandum of understanding to promote the adoption and facilitation of mediation in aviation-related disputes in Asia.

Paul Ng, co-chair of the Mediation Standing Committee of the Hague CAA and head of aviation at regional law firm Rajah & Tann, said: “The aviation industry

is a crucial arterial of global commerce. An efficient method for dispute resolution between industry players is key to helping the industry back to growth and success. We are especially delighted to partner with SIMC, the leading Singapore institution specialising in cross-border dispute resolution, our natural choice as a key partner when it comes to mediation for our sector in Asia.” ➔



“In a fast-moving, mission-critical industry like aviation, the speedy resolution of disputes is absolutely essential. Of the mediations administered by SIMC, 90% take only one day and enjoy a settlement rate of over 70%.”

Chuan Wee Meng,
CEO, SIMC



“The agreement with US Trade Representative Katherine Tai grounded the Airbus-Boeing dispute.”

Valdis Dombrovskis,
executive vice-president,
European Commission



Sia Kheng Yok, chief executive of the Association of Aerospace Industries (Singapore), added: “The aviation and aerospace ecosystem is highly interconnected, and parties commonly enter into multiple or long-term commercial arrangements, as we’ve seen here at the Singapore Airshow. By embracing mediation as the first option for disputes, aviation and aerospace organisations can find win-win solutions, safeguarding valuable commercial relationships for the long run.”

Under the agreement’s framework,

the Hague CAA will refer such disputes to SIMC to provide case management services. There are no geographical or jurisdictional restrictions on this collaboration. Singapore is considered by many parties to be a neutral location and mediation may take place in an agreed-upon location other than Singapore. It may also be online or a combination of in-person and virtual.

As the SIMC cites, even if the mediation is not conducted in Singapore, SIMC, being a not-for-profit institution based in Singapore, enjoys the same reputation of neutrality when managing mediations of cross-border disputes. The geographical origins of parties conducting mediation at SIMC span nearly 60 jurisdictions.

According to the SIMC, it is currently developing detailed rules and protocol for this collaboration with the Hague CAA: “With the reopening of international borders and resumption of business travel, cross-border commercial transactions in the aviation sector will inevitably rise, as will the number of disputes arising from such transactions. As we work out detailed rules and protocols for this collaboration with Hague CAA, we are also reaching out to industry and professional associations to share the benefits of mediation as a dispute resolution with them and their members. One such planned outreach initiative would be to host a briefing session for the Association of Aerospace Industries (Singapore) for its members. Details will be shared via our LinkedIn page and website when they become available.” **AI**

RIGHT:
Established in 1995, The WTO operates a global system of trade rules, acts as a forum for negotiating trade agreements and it settles trade disputes between its members.
WTO



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Eight Questions

Web Manuals streamlines the documentation process for airlines, removing the piles of paperwork associated with all aviation aspects. It allows operators to focus on flying safely and efficiently.

Martin Lidgard, CEO of Web Manuals, spoke to *Air International* on what this has brought to the industry

Question 1: What do you believe Web Manuals offers the aviation industry? Has there been any resistance by operators to the technology? If so, how have you overcome this?

Together with my co-founders, I launched Web Manuals in 2012 after recognising the potential for a standalone digital document management business. Since then, we've supported aviation businesses by developing effective digital document solutions – whether operational, safety or regulatory manuals – and making them available within one system. The aim is to simplify compliance management while making the authoring and distribution of operational documentation easy and accessible to operators of any size.

What used to be a tedious task is now seamless, with thousands of pages of text streamlined and placed in the user's hands. Using a system like Web Manuals helps our customers regain control over their documentation. This brings significant savings in time and administrative costs while improving regulatory compliance and flight safety.

Web Manuals started during the early years of digitalisation in the aviation industry.

This meant that some customers were concerned about us hosting their manuals for them and whether their local authorities would approve a tool like Web Manuals. Our approach to address these concerns was to raise the bar for ourselves by getting ISO 9001 and ISO 27001 certified within the first two years, while offering as much support and transparency in terms of our quality, safety, security and compliance efforts as possible. With well over 600 customers in about 90 countries around the world, it is safe to say that we have overcome these challenges.

Question 2: Web Manuals recently made a significant move by acquiring ManualAI Sweden, a company renowned for its AI-based search technology in Gothenburg. This acquisition is set to enhance Web Manuals' digital documentation system with bespoke AI functions. Could you shed some light on the benefits this will bring to clients?

We've been actively working to accelerate ahead of our competitors and incorporate AI-driven technology into our platform. Our aviation customers work with a wide variety of regulatory manuals unique



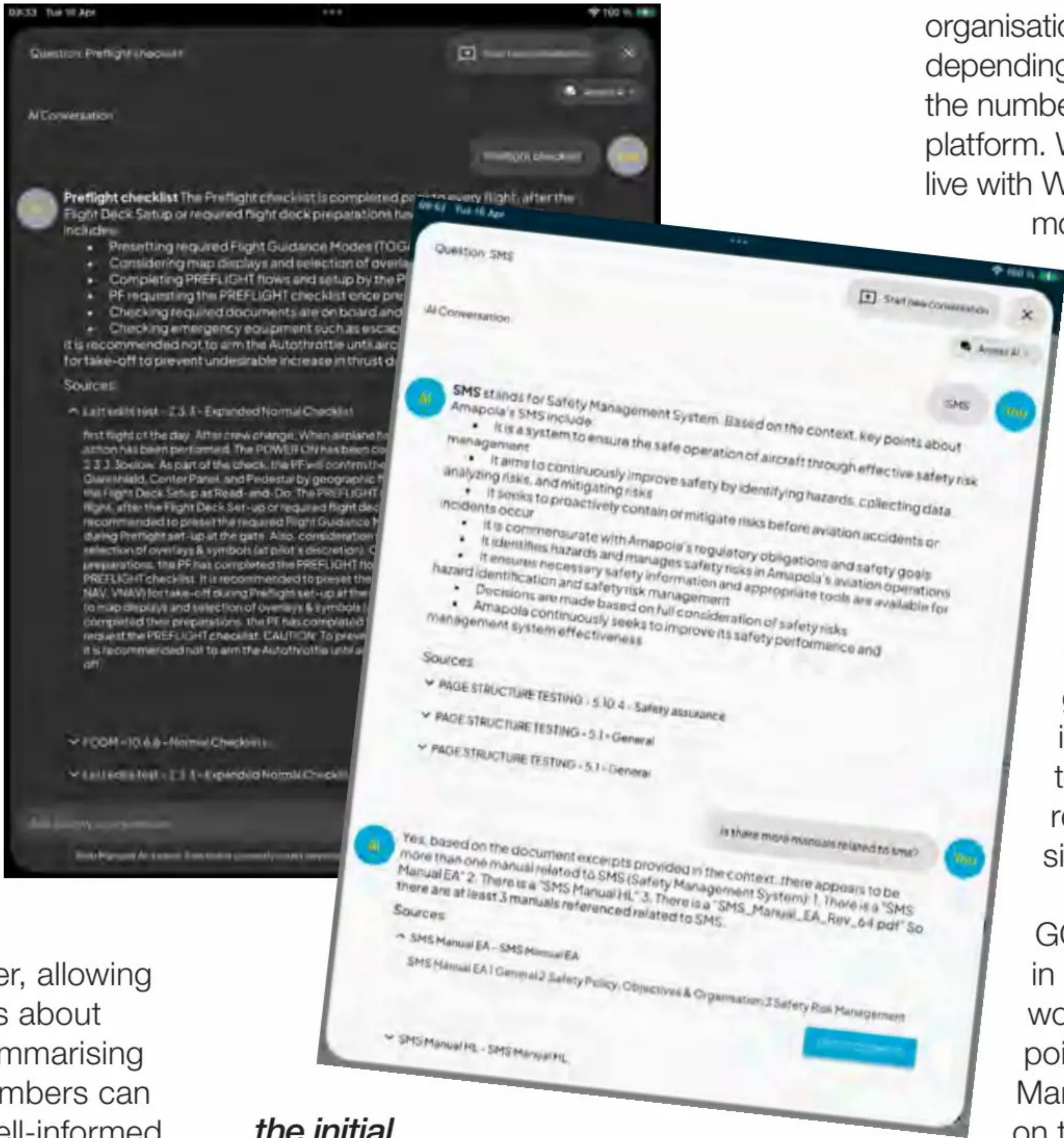
to their operations, which can make finding important information quickly a challenge – even when using a digital tool such as Web Manuals.

We selected ManualAI to enable us to take the next step of incorporating AI into our own system. ManualAI's experience and understanding of enabling pilots and crew to navigate manuals were a perfect fit for us.

Since acquiring the business, we've been able to launch Web Manuals Amelia AI and its first feature, the AI-powered search. The AI-powered search function will support aviation organisations in accessing information faster, allowing them to ask Amelia questions about their manuals and receive summarising answers. Pilots and crew members can confidently make safe and well-informed decisions while avoiding costly diversions and delays. With the ability to source information that is unique to the operation in question, providing a convenient summary and relevant page references, Amelia will support aviation customers to ensure the safety of their operations through effective knowledge-sharing.

Amelia will be the first of several AI-powered product updates. Expect new functions harnessing AI's power to improve our customers' experience.

Question 3: Could you walk us through the process of a company adopting Web Manuals? What does the training schedule look like, and what kind of support is offered during



the initial stages of implementation?

We understand that implementing a system like Web Manuals can be daunting, especially if a company previously worked with paper documentation before going digital. We aim to make the implementation process as seamless as possible and we pride ourselves on delivering a personalised customer service experience with knowledgeable and friendly guidance to ensure our customers' success in their daily operations.

Our team frequently meets with customers to ensure we provide excellent support and share best practices during the project. The aim is to tailor the onboarding process to meet their

organisation's needs, and it can vary depending on the company type, size and the number of people who would use the platform. While customers typically go live with Web Manuals within three to six

months, our fastest customer did all the work themselves and went live within a week!

We offer training and workshops to help our customers drive change within their own organisations and support them with transitioning existing manuals into the Web Manuals application. Once the customer is set up and has gone live, our global customer support team is on hand around the clock to answer incoming requests, resolve any potential issues or simply offer advice.

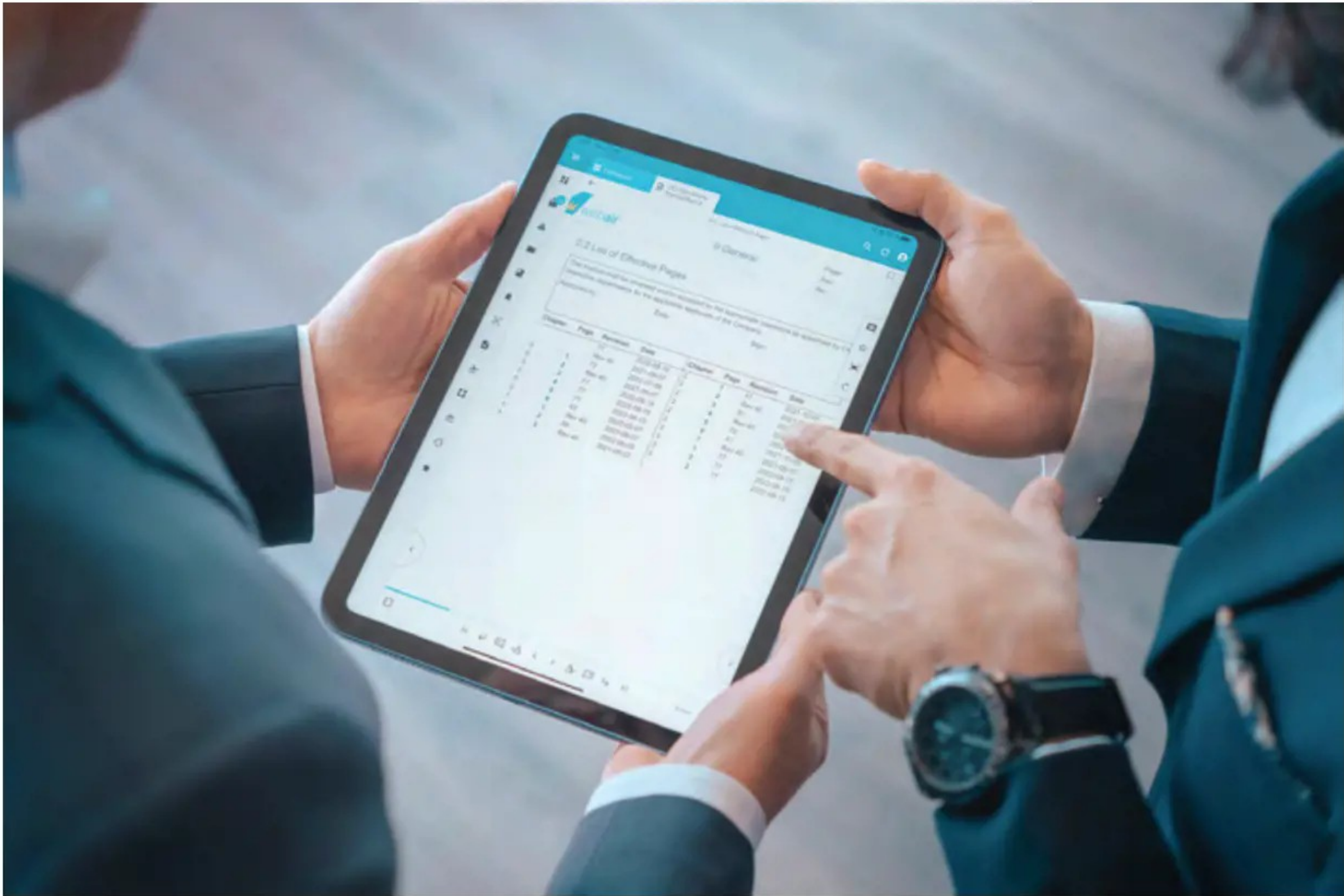
We also host our three annual GO DIGITAL user conferences in different locations around the world. These events offer a meeting point for all members of the Web Manuals community. Collaborating on this scale has allowed us to build a system around the needs of our customers and with our long-standing clients, which means we can tailor the agenda to align with their business goals.

Question 4: Regarding sales within the aviation sector, has a particular global region reacted more positively than others?

Web Manuals is a global company with aviation customers across Europe, America, the Middle East and Asia-Pacific. We have more than 600 customers that range across business jets, airlines, helicopter operators, flight schools, MROs, UAVs and drone operators, airports, ground handlers and more. As a global company with offices in Sweden, San Diego, New York, Singapore and, most recently, Sydney, we have over 300 customers in Europe, about 200 in North and South America and about 100 in Asia-Pacific, Africa and the Middle East. We typically see strong interest among companies and countries that have a keen dedication to flight safety and regulatory compliance.

The opening of our new Australian entity in February this year was in response to the growth of our business in Asia-Pacific, where we increased our customer base by more than 60% in 2023, as well as the growing appetite for digitalisation in Australia and New Zealand.

Across all regions, the response to our digital document management system and customer service has been positive, and we hope to continue this as we support an increasing number of aviation businesses in making the switch to digital.



Question 5: Are there specific differences that smaller operators request compared with larger airlines? If so, what are they?

We provide a highly personalised service to all our customers, regardless of their business size. That said, smaller operators and larger airlines may interact differently with our platform.

Most organisations will have a select number of manual owners who are responsible for managing the documentation, making revisions and distributing to other team members. Readers, such as pilots, crew or maintenance personnel, use our Reader Apps to access relevant manuals and assess how new amendments could impact their work. For a larger organisation, we typically see many more subject-matter experts in all different departments participating in the writing of manuals, not

in their Type Certification preparations. For example, in 2022, we supported Matternet in achieving FAA Product Certification for its Matternet M2 drone.

To become Type Certified, operators must have a flight and maintenance manual that outlines details on how the vehicle operates. Working with digital manuals can streamline this process, making it easier to collaborate in the creation of their aircraft manuals.

Personally, I am excited by the potential of eVTOLs. These aircraft could form a new layer of infrastructure for cities and be used for various cases, such as the delivery of urgent medical goods. Digital compliance tools that align with the forward-thinking nature of eVTOLs will be key to the introduction of these new types of aircraft into existing air space.

Question 7: Where do you see the future of this technology?

OPPOSITE:

The commercial aviation industry has quickly introduced digitised manuals, with many airlines asking why this technology wasn't available sooner

All images via Web Manuals

BELOW:

Web Manuals operate with three core principles: leadership, enthusiasm, and responsibility, each of which is reflected in the staff's passion for the product. Employee days out are a regular reward for outstanding successes



just the central technical publications team. This is something we love to see, as we believe the democratisation of knowledge sharing in aviation organisations is a way to drive safety.

Supporting businesses with their compliance management also means presenting a variety of regulatory content within Web Manuals. This includes regulations issued by EASA, FAA and other national regulators and international standards organisations, and is generally specific to the kind of organisation and the regions in which they operate.

Question 6: Web Manuals also works with drones and UAV operators. Are you looking to get into the eVTOL sector with your products? If so, what changes must be made to adapt to this emerging market?

We already work with a range of customers in the UAV and eVTOL space, simplifying their document management challenges and often playing a key role

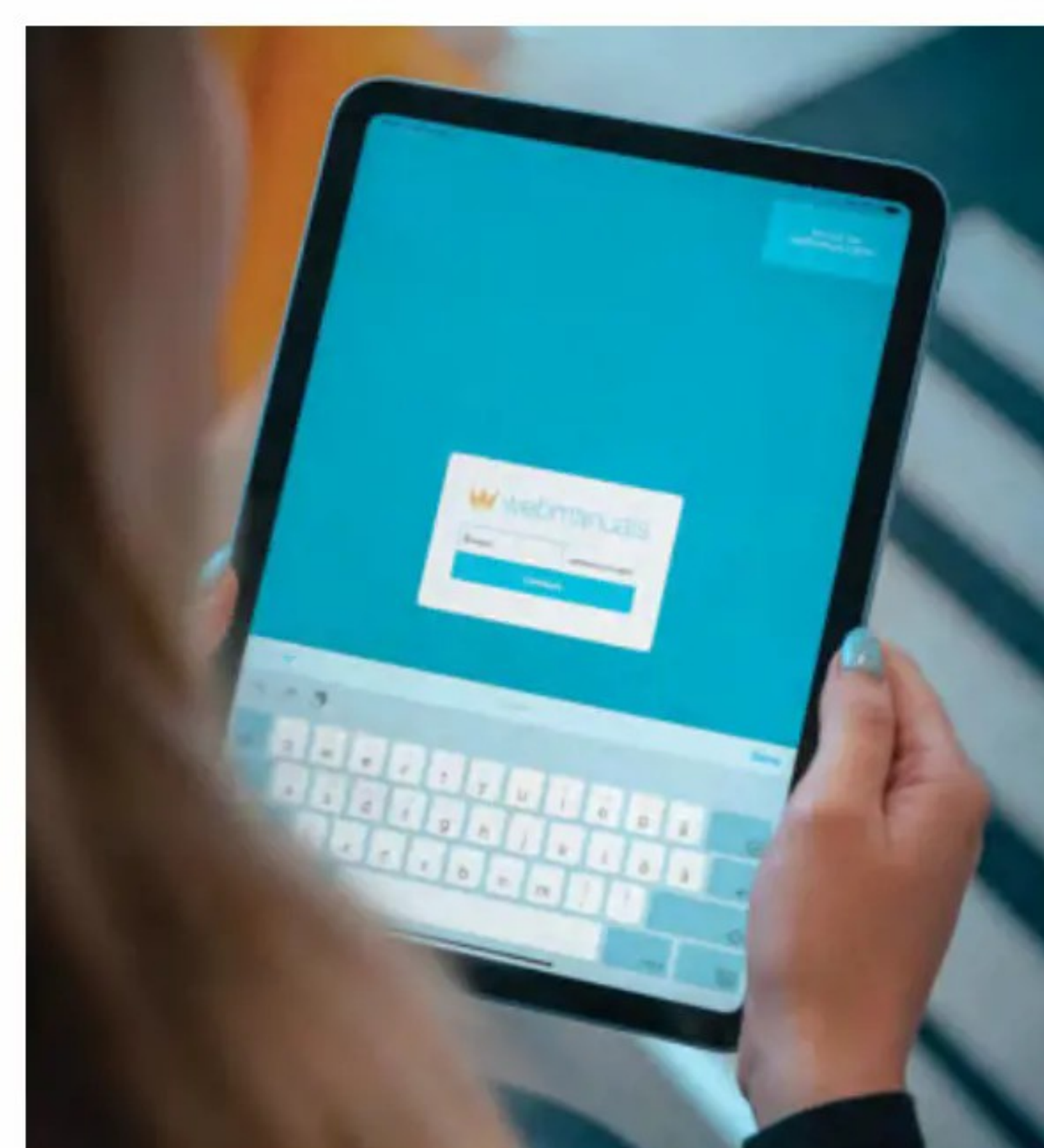
What capabilities do you expect to be added?

The capabilities of AI are truly exciting. We're actively working to develop our technology and looking for new ways to elevate the productivity, effectiveness and safety of our aviation customers. Once officially rolled out to customers, we see several new applications of AI in the areas of compliance, productivity, and interactivity.

Amelia is just one of several upcoming product launches, and we're excited to drive further innovations that will transform aviation compliance as we know it.

Question 8: Away from aviation, how do you spend your free time? Do you have any hobbies?

I enjoy numerous sports with my family and friends, such as hiking, skiing, tennis and sailing. The kids are just getting to the age where we all enjoy doing these activities together. Where we live in Sweden, it's easy to get out, do any of these activities, and then hit the beach to unwind. **AI**



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Or order online at: www.keypublishing.com

AIR International, ISSN 0306-5634 (USPS 4349), is published monthly by Key Publishing Ltd, PO Box 300, Stamford, Lincolnshire, PE9 1NA, UK.

Airfreight and mailing in the USA by agent named
World Container INC 150-15,
183rd St, Jamaica, NY 11413, USA.
Periodicals postage paid at Brooklyn NY 11256.

POSTMASTER: Send address changes to AIR International, Air Business Ltd, c/o World Container INC 150-15, 183rd St, Jamaica, NY 11413, USA.

Subscription records are maintained at Key Publishing Ltd,
PO Box 300, Stamford, Lincolnshire, PE9 1NA, UK.
Air Business Ltd is acting as our mailing agent.
• ISSN 0306-5634 •



Air International is published monthly by
Key Publishing Ltd,
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Stamford, Lincs,
PE9 1XQ, UK
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